

Coal Age

SEPTEMBER, 1945

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DETROIT



PLANNING FOR PROGRESS IN COAL . . . P. 82

FEWER WASHOUTS ... FEWER GREASINGS ...

CAR MAINTENANCE CUT 20 %



SUN MINE LUBRICANT Stays Put in Plain-Type Car-Bearings, Reduces Bearing-Failures from Bad Water-Conditions

Water-conditions were bad in a West Virginia mine, and, as a result, car-lubrication was a constant headache. The mine-cars were equipped with three different types of plain bearings and lubricated with a high-priced specialty grease. But water continually washed the grease out, and grease-consumption was high.

Bearing-failures and replacements were frequent, and maintenance-costs were at a high level. That was the picture when a Sun Lubrication Engineer was called in.

A Sun grease developed to resist the washing-action of mine-water, was recommended, tested, and an immediate improvement noted. All cars were then lubricated with this grease, and, after more than a year, officials figured savings on car-maintenance had been 20%.

Results like this are typical wherever Sun Engineers and Sun mine lubricants are working together. For full information on Sun's reliable lubricants for all mine machinery, call the Sun man near you, or write

SUN OIL COMPANY • Philadelphia 3, Pa.
Sponsors of the Sunoco News-Voice of the Air — Lowell Thomas



SUN INDUSTRIAL PRODUCTS

OILS FOR AMERICAN INDUSTRY



Here comes a blue star turned into a blue chip

THE sooner those boys step off your service flag (or someone else's) into your business, the sooner you're going to have a new lift, unlike anything you've felt for years.

Employee training? They're the finished products of the greatest program of finding and developing skills this world ever saw.

Morale getting a little low around the place? A few of these lads with their eagerness to get back and get ahead will snap it up in a hurry.

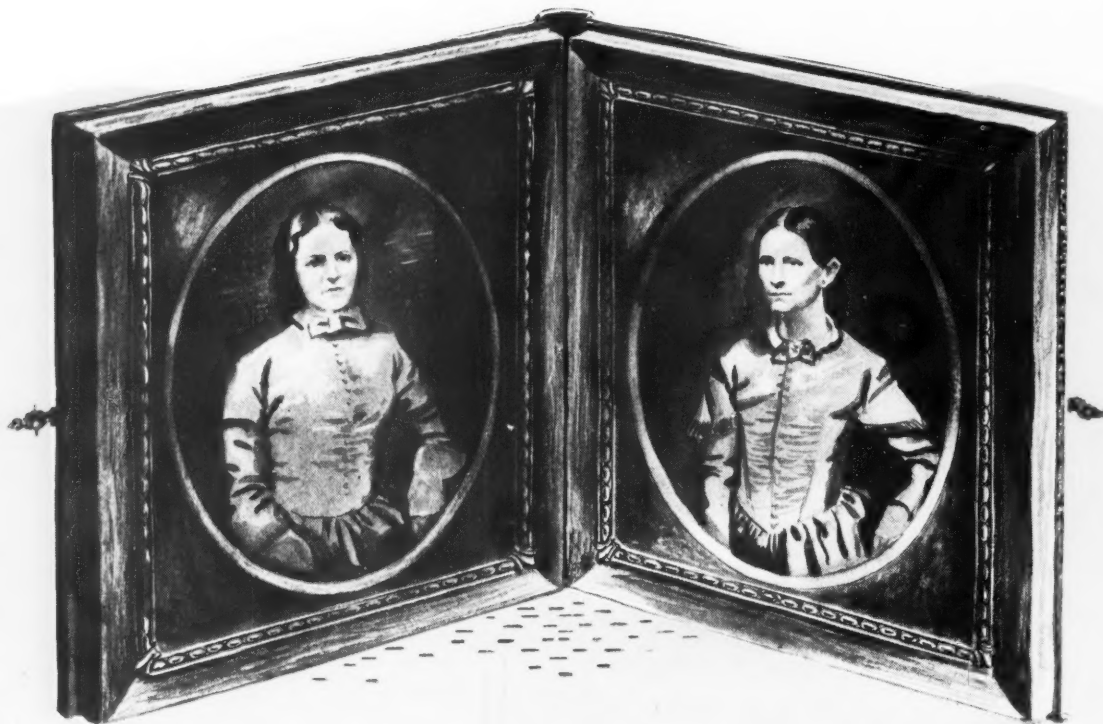
Discipline a little lax? These boys are the essence of discipline at its best. And they'll *keep* it, because they know they could not coast on their war jobs—they must *progress* on their peace jobs.

There are men with practically every skill you could possibly want, *and we mean skill*. Those skills are good enough to lick the toughest job the world ever saw. Use them to help you lick the business problems ahead.

These men are blue chips.

Published in cooperation with the War Advertising Council with the gratitude and pride all Americans feel for our fighting men
—by The B. F. Goodrich Company.

to do one thing and do it



Family albums . . . cherished pictures of your children . . . photographs of all types — all possible because of the invention of the camera! In 1839 Joseph Saxon obtained a small lens and metal plates and made a crude camera and secured an "exposure" from a rear window of the Mint in Philadelphia. Since then, Philadelphia has been the scene of 31 photographic firsts — down to 1940 when the first museum devoted entirely to photography opened there!

Protecting mine equipment . . . giving it longer life . . . making it operate better — all possible because Hulburt of Philadelphia produced a Quality Grease for mines 26 years ago! For a quarter century Hulburt has specialized in lubricating grease for coal mine equipment, offering with the grease an Engineering Service to solve lubrication problems. The value of Hulburt lies in the supreme value of its Quality Grease and its Engineering Service.

HULBURT OIL & GREASE COMPANY . . PHILADELPHIA, PENNA.

Specialists in Coal Mine Lubrication

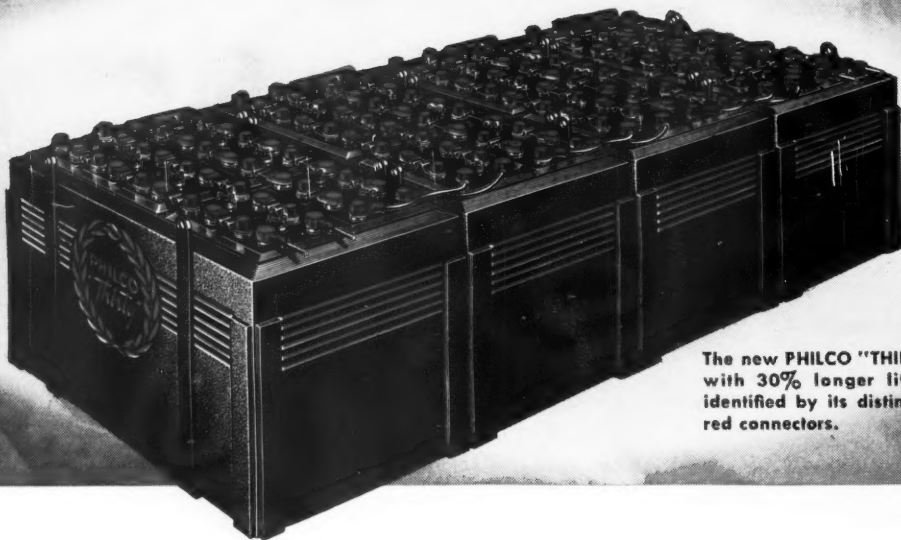
SUPREMELY WELL



HULBURT
Quality
GREASE

FOR THE LATEST IN
MODERN MINE BATTERY DESIGN...

Specify **PHILCO**



The new PHILCO "THIRTY" with 30% longer life is identified by its distinctive red connectors.

MORE THAN EVER, today, Philco stands out as the leader in the development of modern high capacity, long-life storage batteries for mine haulage. Well known to mine operators is the pioneering work of Philco with its famous extra capacity XL and XVL type Batteries. And now, in addition, the great new Philco "Thirty" with 30% longer life, is available in increasing quantities for current deliveries. Powered by modern Philco Batteries, your locomotives and shuttle cars haul more tons. Philco dependability and longer life save you money. Write today for new descriptive catalogs. **PHILCO CORPORATION, Storage Battery Division, Trenton 7, New Jersey.**

For 50 years a Leader in Industrial Storage Battery Development



The complete line of Philco Mine Storage Batteries includes high capacity types of proven long life and economy for all battery-powered locomotive and shuttle car equipment.

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J. E. BLACKBURN, JR.
Director of Circulation

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Director of Circulation, COAL AGE,
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more than
money
with...*



BETHLEHEM PREFABRICATED TRACKWORK

Track belongs in the mine, not in the Worry Department.

When Bethlehem handles the track job, you're relieved of the figuring . . . worrying . . . even the cutting and curving of rails. Give us a blueprint or sketch of your mine layout. We'll take care of the track, including the calculations.

Bethlehem's prefabricated track is ready to assemble when it reaches you. All you do is bolt it together according to plan.

No more bothersome details. There's your whole layout, figured in advance and built like a hand-tailored suit. Switch stands, switches, turnouts, guard rails, frogs, joints

and bolts . . . everything's ready, with the rails precurved and the cutting all done.

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Call for a Bethlehem engineer; tell him your problems. You'll find he can help you.





STRIPPING IN A "STREAM"

*-but these tires
keep loads moving!*

HERE'S where work-tires take a daily bath and beating — and come back for more.

On the Wade and Richey Company's coal-stripping job in Alabama, seven trucks like the one above — all equipped with Goodyear Hard Rock Lug tires — haul away the coal. But a perverse creek nearby puts much of the area under several feet of water. So loads must be pulled through sticky mud and slime — often over sub-

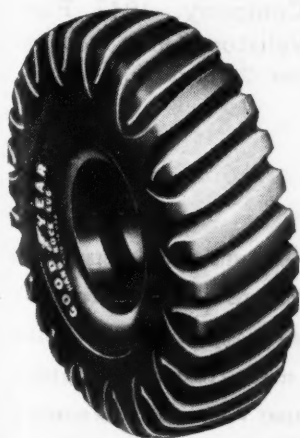
merged and murderous rocks, shale, sharp stones.

Yet these Goodyears — all veterans of many months of rough and rugged service at various ore and quarry operations before their transfer here — are delivering top-notch performance on this tire-killing job because they're built tough for tough going, have the stamina to take long punishment.

The other Goodyear off-the-road tires, too, are job-proved, high-hour performers — the great Sure-Grip with *open center* tread for drive wheels where traction counts most, and the time-proved All-Weather Earth Mover for drawn vehicles where easy rolling is a must.

And because these tough work tires consistently deliver lower costs-per-ton-mile, more and more contractors now buy Goodyears for their units. Chances are you will, too, once you get the story from men now using them.

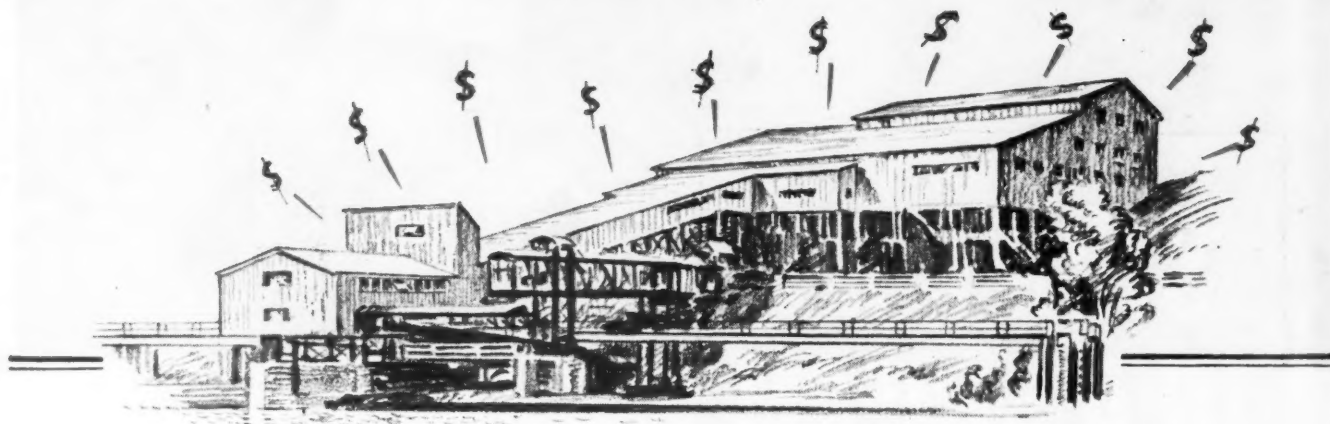
Sure-Grip, All-Weather—T.M.'s The Goodyear T. & R. Co.



GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

How to make the most *with* ~~of~~ MECHANIZATION



OPERATORS of more than $\frac{1}{3}$ of all the mines in this country have mechanized their mines, below and *above* ground—and more are doing so—for only one reason: *with mechanization they make more money!*

MODERN mechanized equipment reduces costs—by cutting labor and waste. It speeds production. It raises product value by producing clean

coals, which win the better markets—the higher prices.

Morrow Tipples are found in a high percentage of all the modern mechanized mines, because

Morrow streamlines production from the mine to cars or barges, in shorter time, at lower costs—in the best condition to **SELL!**

Morrow engineers are available now to design and equip more efficient preparation plants. Ask Morrow to assign an engineer to study your situation. Write The Morrow Manufacturing Company, 1947 Ford Blvd., Wellston, Ohio. *Division The Wacker Corporation.*

Better Preparation
= **INCREASED SALES!**

1. low impurity content
2. correct sizing
3. high uniformity

MECHANIZE WITH
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BINS AND BIN GATES • FLANGED LIP SCREENS
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A Tribute

*to all those who helped in the
greatest scientific achievement
of all time... the*

ATOMIC BOMB

"TO KEEP THE PEACE"

For the inspiration and leadership displayed by the Executive, Military, and Naval authorities... to the Scientists... Engineers... to Labor, and to those Companies that played a part in this unprecedented achievement, General Cable voices the sentiment of America in extending highest praise and heart-felt appreciation. Because of their scientific genius, their untiring effort and their complete devotion to this gigantic task, Victory comes sooner and all mankind benefits.

General Cable Corporation is also justly proud of the contribution made by its own staff in the engineering development and manufacture of still secret and exceedingly special materials essential in the production of this device of war... and of Peace.

GENERAL CABLE CORPORATION

MANUFACTURERS OF BARE AND INSULATED WIRES



AND CABLES FOR EVERY ELECTRICAL PURPOSE

Engineering between the Equipment and Rubber Belting the Successful Cost Conveyor

The policy of 3-way engineering teamwork, which U. S. Rubber Company advocates, has been proved successful in hundreds of installations. It is the quickest, surest way to develop a conveyor system for handling coal, ore, rock, which is efficient, economical to operate and can be counted on for long, continuous service.

**MINING
ENGINEER**

**EQUIPMENT
ENGINEER**

**U. S. BELTING
ENGINEER**

Team Work Mine Engineer, Engineer and ing Engineer is Formula for Low eyor Tonnage



Serving Through Science

KEEP WIRE ROPE



TEXACO LUBRICANTS

STRONG...LONGER

Use the famous lubricant that . . .

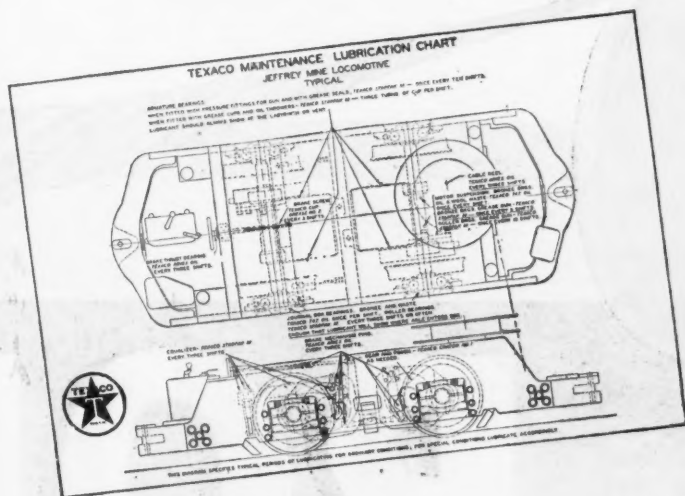
- ★ Penetrates and preserves the core ★ Seals out moisture ★
- Reduces internal friction and wear ★ Prevents corrosion
- ★ Keeps rope flexible

KNOwn the world over for more than 30 years, and constantly improved, *Texaco Crater* is manufactured under the same strict controls and expert supervision that have made Texaco products outstanding for quality and uniformity in every field.

By virtue of special refining processes, *Texaco Crater* has a remarkable ability to withstand extreme heat and cold and to prevent wear. It is highly resistant to breakdown and maintains its excellent lubricating qualities under the most severe conditions. It protects wire rope inside and out, keeps rope strong longer even under the heavy stresses and strains of continuous service.

Used in open gears, *Texaco Crater* cushions load shocks, quiets noise, reduces wear. It doesn't channel or throw off, but clings to tooth surfaces, following through from gear to gear, despite high pressures, temperatures and speeds.

Texaco Lubrication Engineering Service is available through more than 2300 Texaco distributing plants in the 48 States. Get in touch with the nearest one, or write to The Texas Company, National Sales Division, Dept. C, 135 E. 42nd St., New York, 17, N. Y.



FREE! Texaco Maintenance Lubrication Charts are prepared in cooperation with leading manufacturers of underground mining machinery who approve Texaco products for use on cutters, loaders, locomotives, etc. Charts show clearly where and when to use the proper Texaco lubricant. Order the charts you need by make and model of each machine.

For the Coal Mining Industry

Is your ROPE-RIGGED for the big job ahead?

No time like *now* to check over your equipment's readiness . . . for the big competitive job ahead. And in checking your wire rope, include these points:

Are sheaves and drums regularly checked for excessive wear that would injure the rope operating over them? Does the rope get proper handling, lubrication, inspection, maintenance? Is it Roebling "Blue Center" Steel Wire Rope?

If the answers are "yes", bank on dependable, long-lasting, economical rope service . . . for today's toughest, tomorrow's biggest jobs. For "Blue Center", preformed or

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It's the result of fine Roebling steel, exceptional equipment, a century-old tradition of sound workmanship. And whether *your* rope problem is one of selection, operation or maintenance, Roebling engineering service can help you solve it . . . to your advantage.

As government needs taper off, Roebling wire rope will again be available to non-priority users, in order of precedence. Why not place *your* order now?

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Wire Rope and Strand • Fittings • Slings • Cold Rolled Strip • Round and Shaped Wire • Wire Cloth and Netting • High and Low Carbon Acid and Basic Open Hearth Steels • Aircord, Swaged Terminals and Assemblies • Suspension Bridges and Cables • Electrical Wires and Cables • Aerial Wire Rope Systems

ROEBLING

P A C E M A K E R I N

EQUIPMENT *ready...*

ROPE REMINDERS

Because sheaves play such an important part in wire rope life, we make it a point to stress their periodic, careful inspection.

Take the matter of inspecting sheave grooves: At the start of service, the groove's diameter should bear the proper relation to the diameter of the rope to be used in it.

With constant passage of the rope over the sheave in normal operation, the groove is worn deeper, its diameter decreased. If a new rope is placed in this groove, it will be forced down and pinched out of shape. The result is an out-of-round, unbalanced rope, subject to severe abrasion against the sides of the groove.

Suppose the rope is placed in a sheave groove of too great diameter. Without proper side support, it will tend to flatten out.

Ideally, for the rope to have freedom of action with a maximum of support the sheave groove should support just less than half the rope's circumference.

Gages for measuring sheave grooves can be obtained from your Roebling representative. Use them, frequently. It will pay off in longer, more satisfactory rope life.

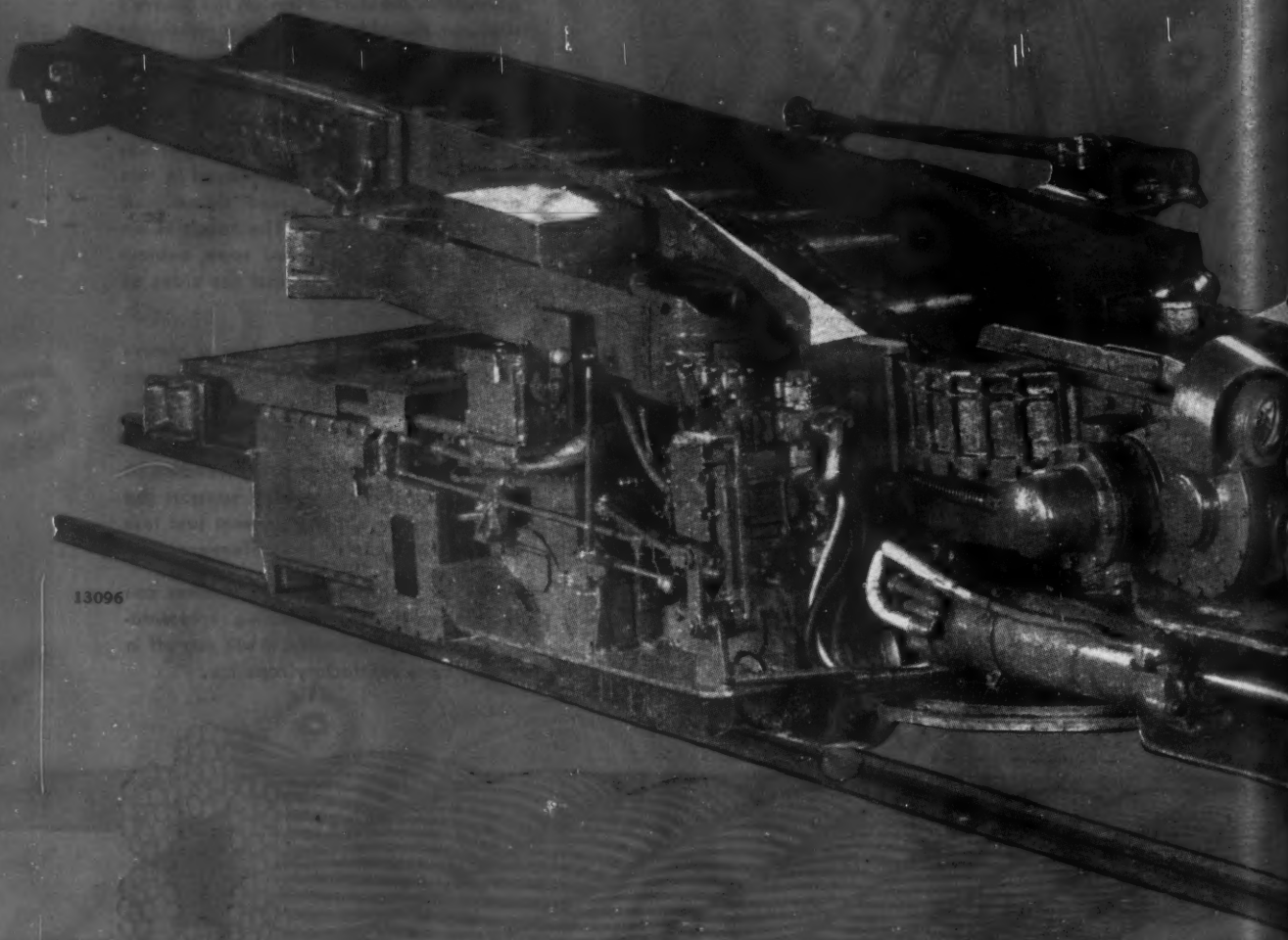


ROE BLING



WIRE PRODUCTS

HIGH CAPACITY LOADING



Goodman MANUFACTURING CO

ON
SHARP
CURVES . . .

IN
CLOSE
POSTING

THE *Goodman* 460

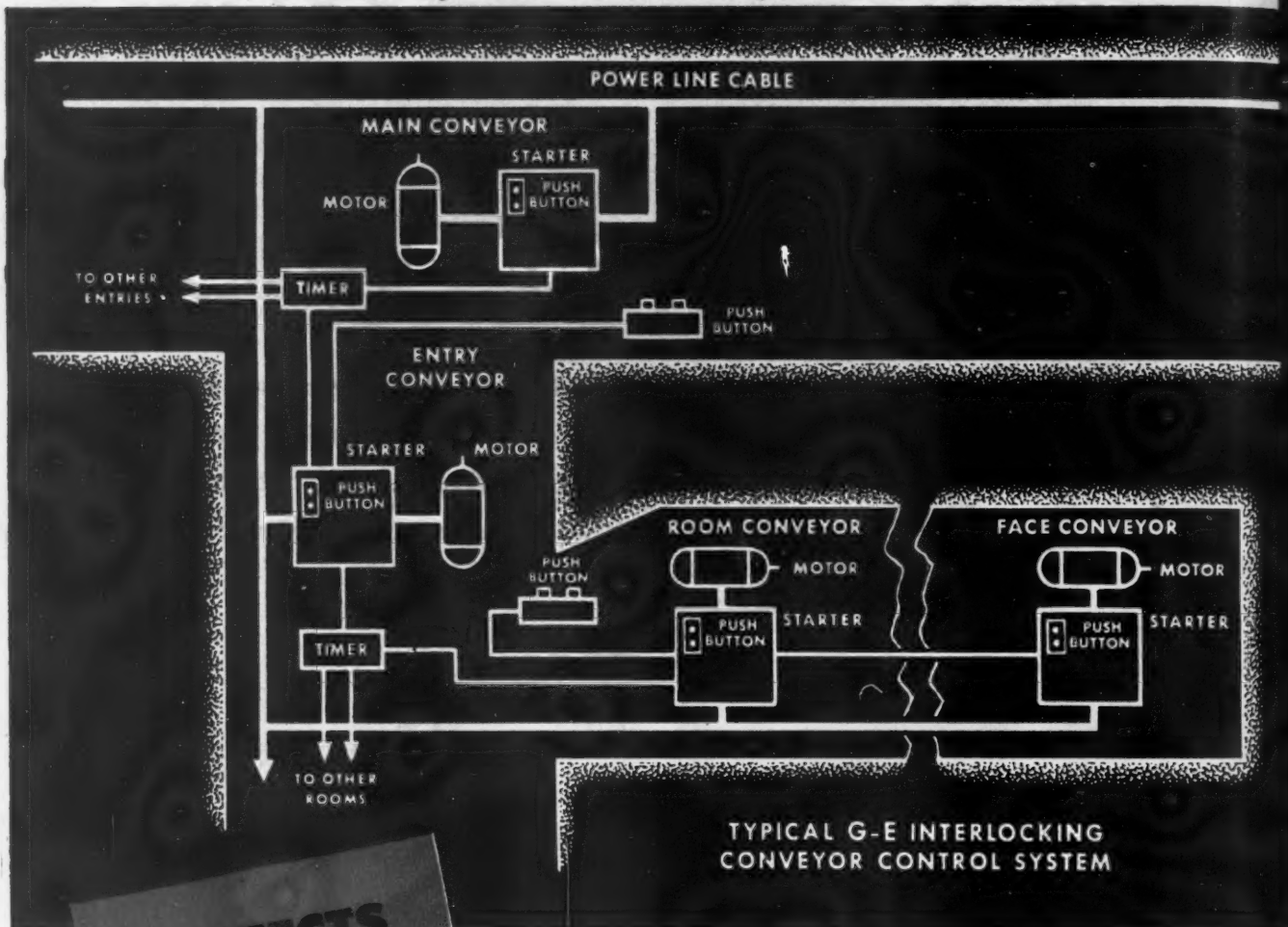
The Goodman 460, with a front conveyor swing of 55 degrees to either side of the track center line and a rear conveyor swing of 40 degrees, loads out on sharp curves and in close posting without sacrifice of capacity.



G COMPANY • Halsted Street at 48th • Chicago 9, Illinois

MORE SAFETY for

Conveyor Operation



**PROTECTS
PERSONNEL**

... Keeps Production Moving!

This schematic diagram shows a typical coordinated system of interlocking conveyor controls that will reduce confusion, accident hazards, and lost time. The motors are connected in sequence, so that if any one conveyor breaks down, all contributing conveyors are automatically shut down, thereby preventing coal pile-ups. All motors are started by momentary contact push buttons. Once a conveyor has stopped, unexpected restarts are impossible until that particular conveyor's START

button is pushed. Push-button stations can be either in the controller, at remote-control stations, or a combination of both, whichever is best adapted to efficient operation.

A prime cause of large voltage dips and momentary overloading of the power system has been the tendency of all motors in an interlocking system to start at the same time. In the G-E systems, sequence interlocking or timers so regulate motor-starting that the motors always restart one at a time.

New G-E interlocking conveyor controls for gassy mines

prevent

COAL
PILE-UPS

UNEXPECTED
RESTARTS

EXCESSIVE
STARTING
LOADS

NOW you can have safe, positive conveyor control that's co-ordinated "right down the line," from main conveyor to working face. And you can have it in gassy mines where permissible equipment is required.

The diagram opposite shows a typical arrangement of G.E.'s new control equipment for gassy mines in a conveyor control system that is fully co-ordinated and truly automatic. With a system like this you can eliminate the hazards of dangerous coal pile-ups and unexpected motor restarts.

You can avoid the excessive current peaks which occur when too many conveyor motors start at once.

G-E engineers have had wide experience in putting conveying systems on a safe, efficient basis. Rather than supply you with equipment only, their objective is to recommend a complete plan which insures full protection against common conveyor hazards. If you feel that your conveying system needs tighter control, why not talk it over with a G-E sales engineer soon? General Electric Company, Schenectady 5, N. Y.

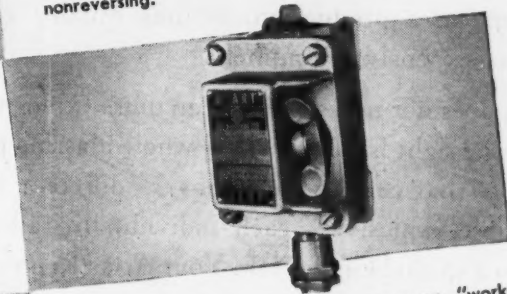


EQUIPMENT FOR BM-INSPECTED MINES



Explosion-proof Starters—Recommended for gassy mines where permissible equipment is required. This starter is built to meet all the requirements of BM Schedule 2E. Available for a-c full-voltage, d-c reduced-voltage, or d-c full-voltage starting. All have a START-STOP push-button station in the enclosure cover, and can be reversing or nonreversing.

Push-button Stations—The G-E START-STOP, momentary-contact push button, either in the cover of the starter or remotely mounted, is made according to the requirements of BM Schedule 2E and provides undervoltage protection. Unexpected motor restarts which might cause injuries to operators are avoided because the START button must be pushed to restart the conveyor motor.



"BM" Motors—These sturdy conveyor "work-horses" meet all the design requirements of Bureau of Mines Schedule 2E. Their totally enclosed, fan-cooled construction effectively seals out dirt, dust, and dripping water, assuring long life and little maintenance. Available in all popular sizes and types to meet your mine requirements.

Buy all the BONDS you can—and keep all you buy

GENERAL  ELECTRIC

657-44-148

"All Is Not Gain That Is Put in the Purse"



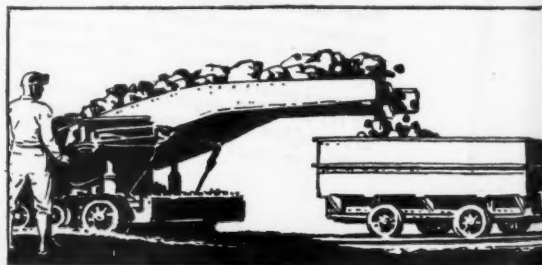
...beware of false savings in blasting, too!

Many an operator has tried to save pennies when buying explosives, only to lose dollars as a result of poor quality coal, wear and tear on the loader, and slower and more expensive crushing.

Good blasting insures good results *on the whole cycle of operations*. It increases production, insures quality coal and gets more work out of expensive equipment.

This does not necessarily mean more explosives. It is the right handling of the whole blasting procedure that counts. Atlas has 25 different permissible explosives—each individually tailored to do a special kind of job. Your Atlas Representative will help you select and use them *effectively*. The up-to-date "know how" he represents will save you time and money.

Good Blasting Makes
Money—Poor Blasting
Loses Money ▼



ATLAS

EXPLOSIVES

"Everything for Blasting"



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Jeffrey

UNDERGROUND CONVEYORS

Jeffrey underground conveyors speed up production and reduce transportation costs in many operations. Jeffrey builds 17 standard units — chain or belt types — from which 54 combinations are available. There is a type to meet every mining condition. Our engineers and technicians can determine the type best suited to coordinate your underground requirements into a smooth-operating system.





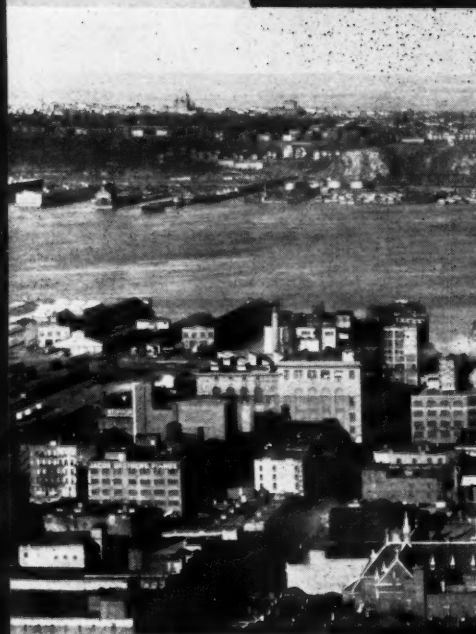
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During the past year

**1,559,335
TONS OF COAL**

*were used by American
and foreign ships in
International Commerce*



Jeffrey feels a certain responsibility for this large tonnage because of the vast amount of mechanical equipment and service parts supplied to mines producing this coal. Cutters—Drills—Loaders—Underground Conveyors—Locomotives—Fans—and sizing and screening equipment... all have a definite place in this production. Our engineers know the important part Jeffrey Mining Equipment has in the production of coal and design accordingly.

J

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TO ALL**

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- FAN
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Service Station

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Jeffrey

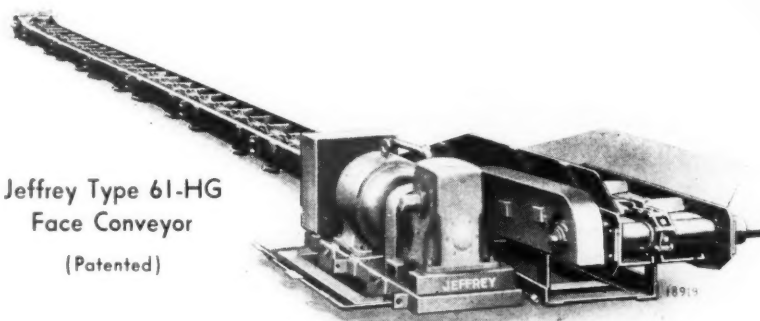
CONVEYORS

**JEFFREY SERVICE
TO THE COAL MINES
MEANS SERVICE
TO ALL INDUSTRY**

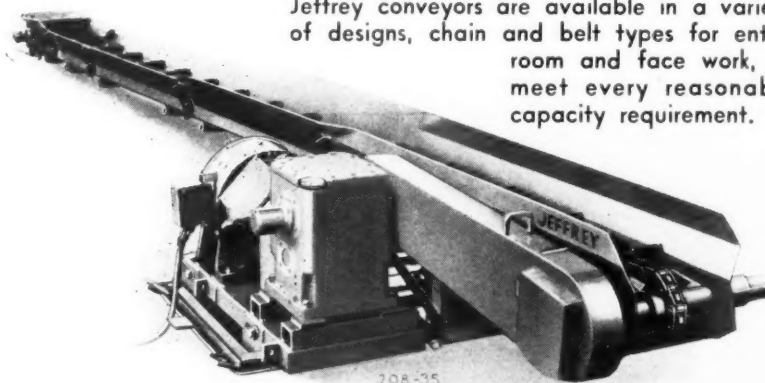
**JEFFREY EQUIPMENT
FOR COAL MINES**

- BLOWERS
- CONVEYORS
- CRUSHERS
- CUTTERS
- DRILLS
- FANS
- JIGS
- LOADERS
- LOCOMOTIVES
- SCREENS

Jeffrey Type 61-HG
Face Conveyor
(Patented)



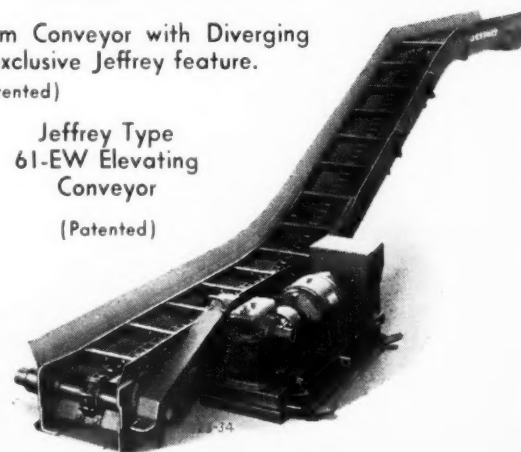
Jeffrey conveyors are available in a variety of designs, chain and belt types for entry, room and face work, to meet every reasonable capacity requirement.



Jeffrey Type 61-AM Room Conveyor with Diverging
Type Head End, an exclusive Jeffrey feature.
(Patented)

Jeffrey Type
61-EW Elevating
Conveyor
(Patented)

- Rugged construction
- Durable materials
- Lightweight design to facilitate moving
- Dependable power equipment
- Economical operation and maintenance
- Safety to equipment and workman
- Simplified method of coupling sections



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No matter how you figure it . . . initial cost, maintenance, or trade-in value . . . heavy-duty trucks are the most economical buy. Every day, more and more truckers are realizing this fact and are swinging to heavy-duty units. This is smart business because one big truck can do the work of several smaller vehicles, thereby effecting important savings.

All Ward LaFrance motor trucks are

designed, engineered, and manufactured for heavy-duty service. They are big trucks with pay load capacity ranging up to thirty tons, and they're built to take a beating and still stay on the job. For complete information about these heavy-duty trucks that are setting new standards, see your local Ward LaFrance dealer. If there is no dealer in your community, write direct.

NOW AVAILABLE to civilian users . . .
a complete line of heavy-duty trucks . . . two,
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WARD LAFRANCE

TRUCK DIVISION

GREAT AMERICAN INDUSTRIES, INC., ELMIRA, NEW YORK



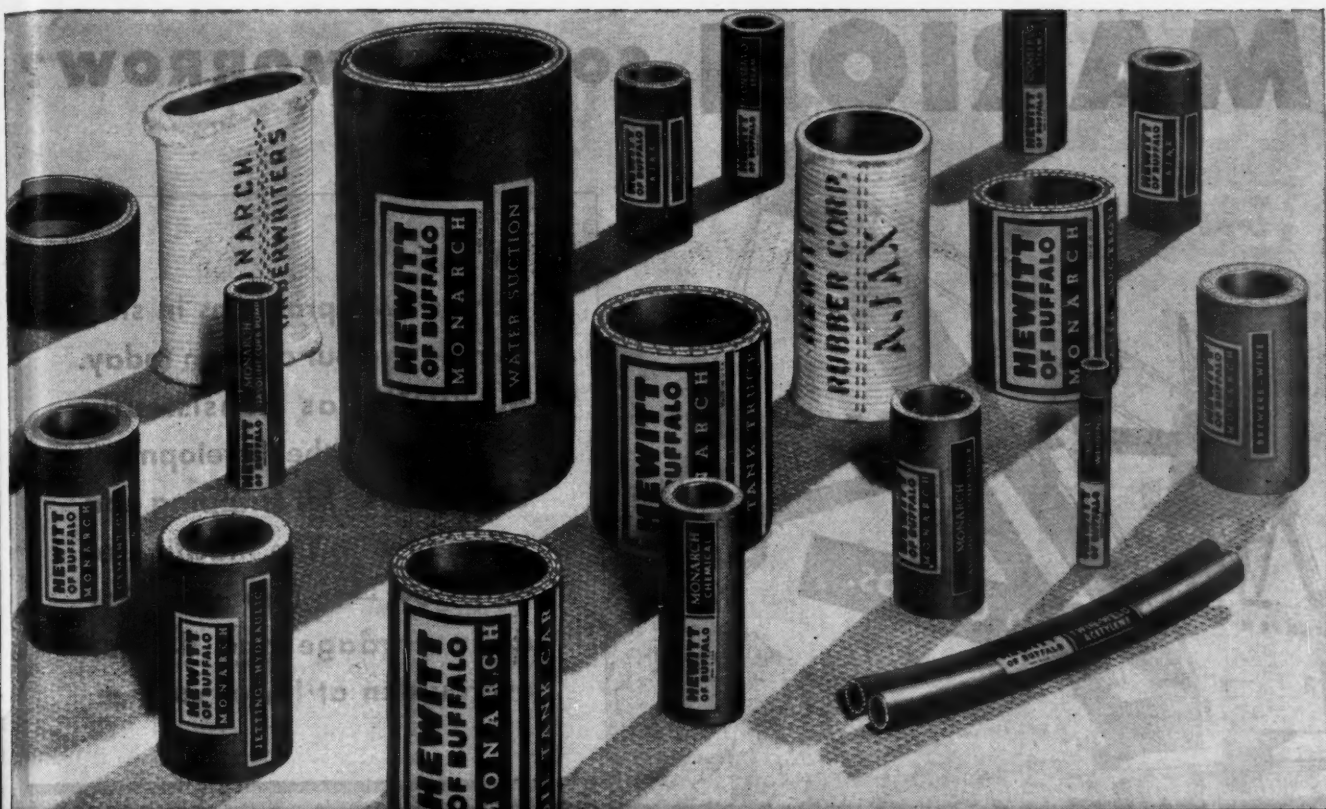
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Get hose that's **JOB-ENGINEERED**
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*Get this great new
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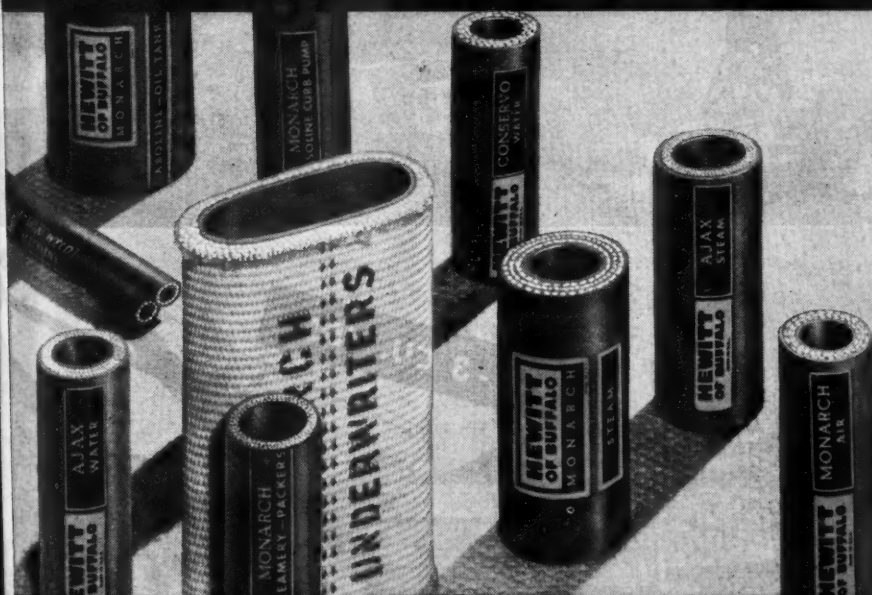


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HEWITT RUBBER *of Buffalo*

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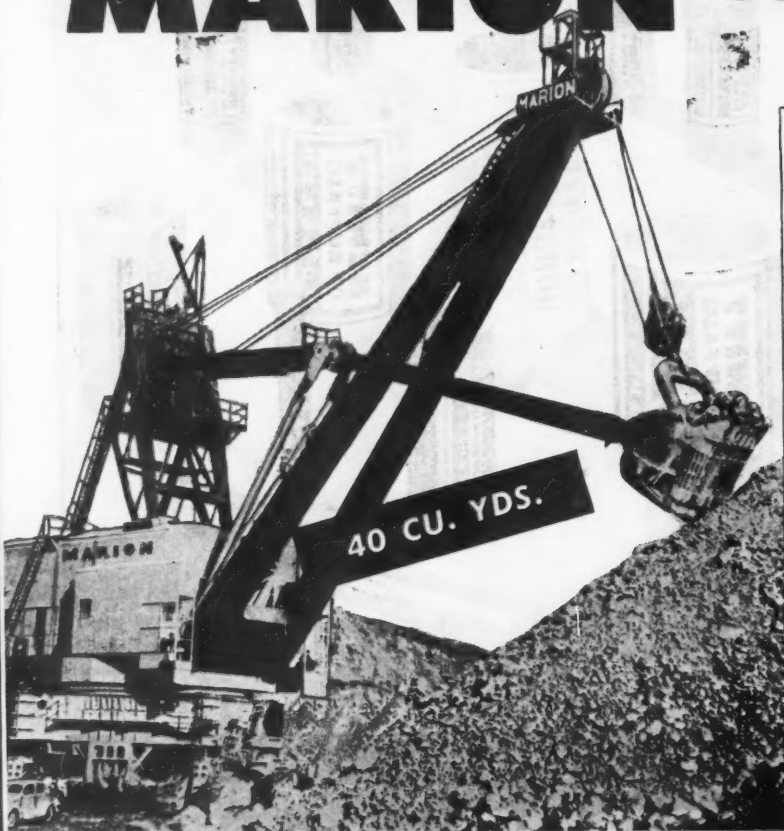
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is just off the press. It gives you complete details so that you can select the proper hose for your individual needs. Send for your copy . . . TODAY.



WHAT PROBLEMS IN COAL STRIPPING MUST **MARION** SOLVE TOMORROW?



Tomorrow's problems in strip mining are our concern today. MARION has consistently pioneered in the development of machines for stripping and is ready with the machine of tomorrow — to handle higher daily yardage and deeper overburden at lower cost.

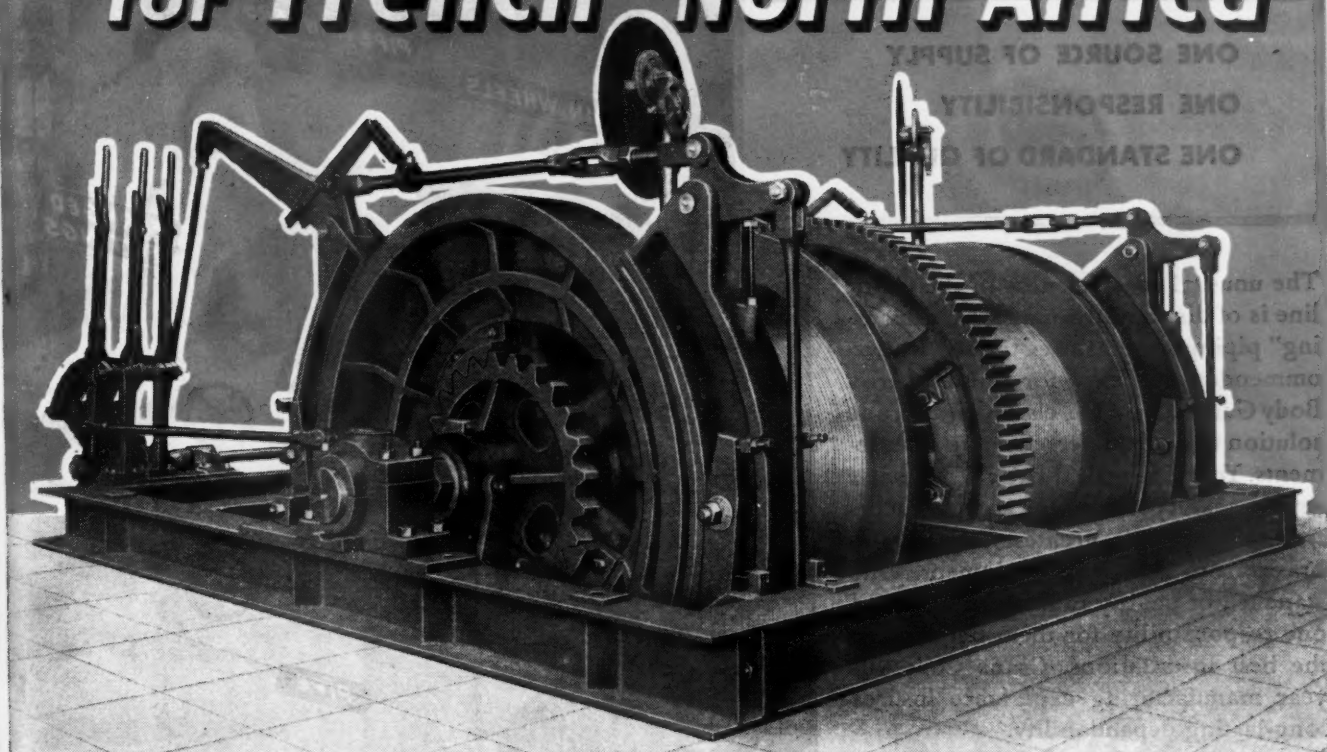


THE MARION STEAM SHOVEL COMPANY, MARION, OHIO

Offices and Warehouses in principal cities

3/4 cu. yd. to 40 cu. yds.

A MODERN VULCAN HOIST for French North Africa



S HOWN above, with gear-guards not yet installed, is one of several Vulcan electric hoists recently shipped to French North Africa for service at isolated mining developments where dependability is highly essential.

Although of moderate size these hoists are of such sturdy construction that maintenance expense should be negligible for many years to come. Their positive toothed-type clutches and heavy-duty post brakes are outstanding features—seldom specified for hoists of this size, yet sure to repay their moderate additional cost many times over in safe trouble-free operation.

Backed by nearly a hundred years of successful experience, Vulcan is building more and better hoists today than ever before and our engineering executives welcome correspondence regarding any present or prospective hoisting problem—no matter how unusual or difficult. Constructive suggestions and preliminary designs will be submitted, so far as possible, without charge or obligation of any kind.

PRINCIPAL SPECIFICATIONS

MOTOR—125 hp., induction type.

GEARS—Double-reduction cast-steel, with machine-cut spur teeth.

DRUMS—Double cylindrical, all-steel: 48" diam. x 33" face, grooved for 2500 ft. of $\frac{3}{4}$ " rope. One rigid and one clutched.

CLUTCH—Positive toothed-type, hand operated.

BRAKES—Parallel-motion post type. Hand operated. 5'6" diam. x 8½" face. Asbestos lined.

FRAME—Fabricated steel; electrically welded throughout and sectionalized for convenient transportation.

DUTY—Unbalanced load of approximately 7000 lb. to be raised at speed of 490 ft. per minute.

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Established 1849

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Heavy-Duty Electric Hoists
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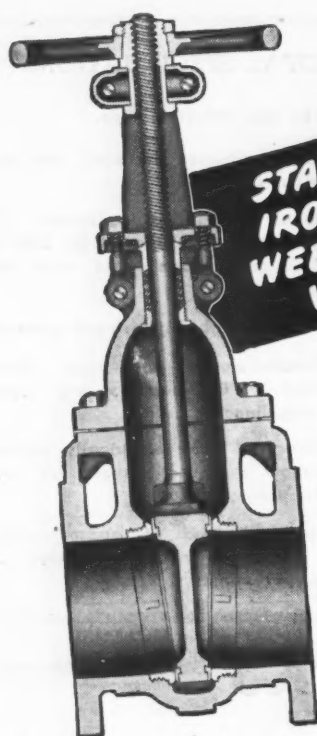
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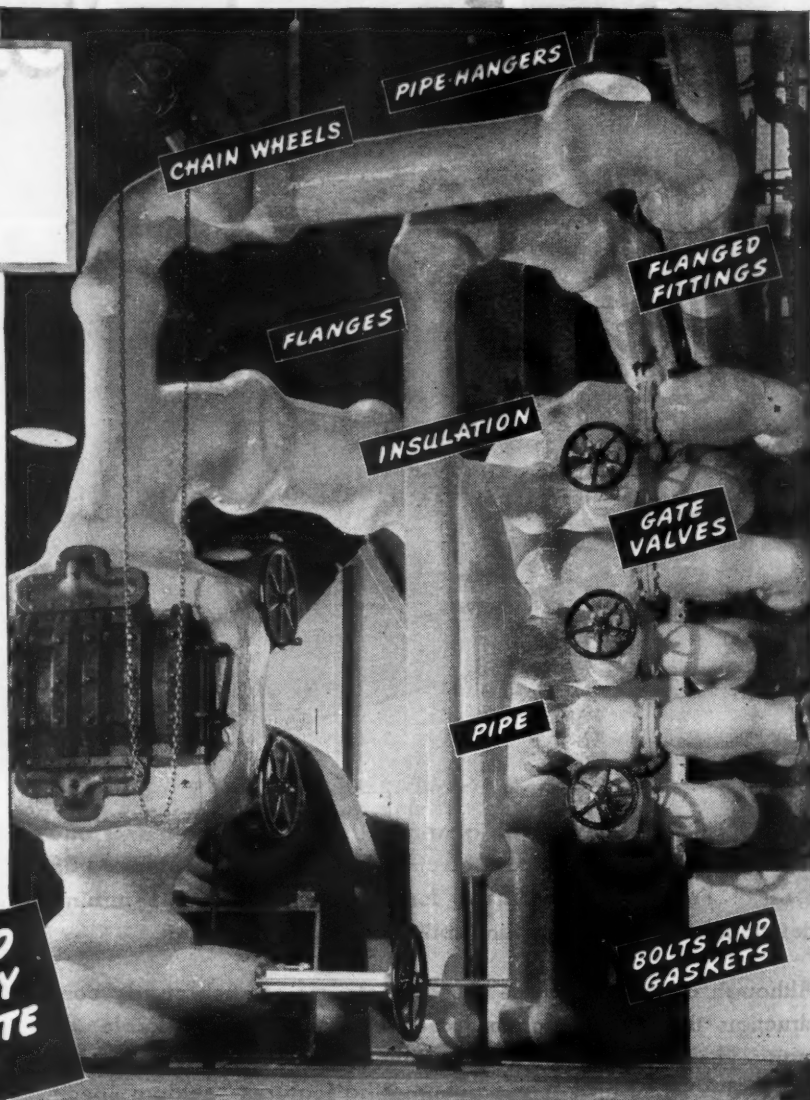
How the Complete CRANE Line Simplifies Piping Replacement Work

ONE SOURCE OF SUPPLY
ONE RESPONSIBILITY
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The unusual completeness of the Crane line is of distinct advantage in "converting" piping systems. See the service recommendations below for Standard Iron Body Gate Valves. Here's a typical Crane solution to many deferred valve replacements. Your Crane Branch or Wholesaler supplies all your piping requirements from the world's greatest selection in brass, iron, and steel equipment. One standard of quality in all materials and one responsibility for them help insure the best installations. Crane Co.'s 90-year manufacturing experience insures long-lasting dependability.



**STANDARD
IRON BODY
WEDGE GATE
VALVES**



Water piping to air coolers

SERVICE RECOMMENDATIONS: Crane Standard Iron Body Wedge Gate Valves are suited for many services in factories and power plants, at all working pressures up to 125 pounds steam. Brass trimmed valves are recommended for steam, water or oil lines; all-iron valves for oil, gas or fluids that corrode brass but not iron. Made in O.S.&Y. and Non-Rising Stem patterns. See page 101 of your Crane Catalog.

Working Pressures

Size of Valve	Screwed or Flanged End Valves		Hub End Valves
	Saturated Steam	Cold Water, Oil or Gas, Non-Shock	Cold Water or Gas Non-Shock
2 to 12 in.	125 pounds	200 pounds	200 pounds
14 and 16 in.	125 pounds	150 pounds	150 pounds
18 to 24 in.	*	150 pounds	150 pounds

*For steam lines larger than 16-in., Crane 150-Pound Cast Steel Gate Valves are recommended. (For sizes under 2-in., use Crane Clamp Gate Valves.)

CRANE CO., General Offices: 836 S. Michigan Ave., Chicago 5, Ill. • Branches and Wholesalers Serving All Industrial Areas

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A good sales company is trained on the premise that you have to work to sell coal . . . just as you have to work to produce it. The training and maintenance of an efficient sales company requires

the sale of a certain volume of coal.

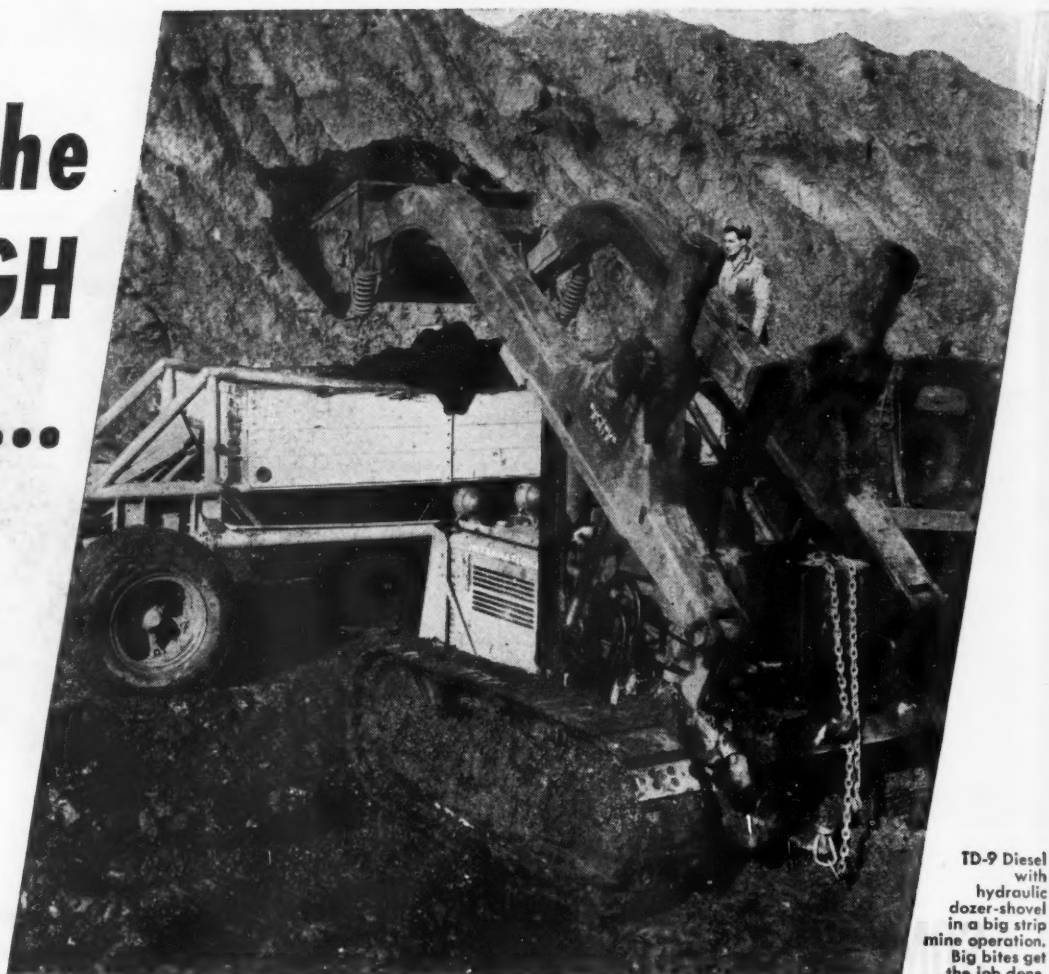
We are producing and selling a large volume of coal today but, because of the demand, anyone can sell it. This offers the tempting opportunity to use any kind of sales talent . . . or to reduce commissions and discounts to the point where coal sales companies have trouble sustaining an efficient force.

Don't make "no bills" for yourself tomorrow by making headaches for your sales connection today.



AMERICAN COAL *Sales* ASSOCIATION . . . Washington, D. C.

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TOUGH
JOBS...**

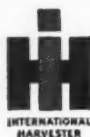


TD-9 Diesel with hydraulic dozer-shovel in a big strip mine operation. Big bites get the job done.

Choose **INTERNATIONAL Diesel TracTractors**

• On the basis of performance, International Diesel TracTractors are leaders among crawlers. The record is clear—maximum work at minimum cost on the tough jobs.

Four rugged Diesel TracTractors bear the name **INTERNATIONAL**—the big TD-18, TD-14, TD-9 and TD-6. Each is engineered to lick the crawler-power problem in its range.



Standardize on International TracTractors. Gain the benefit of International *full* Diesel performance and economy. Take advantage of their many features.

Turn your tough jobs over to husky International TracTractors. See the International Industrial Power Distributor for information.

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INTERNATIONAL Industrial Power

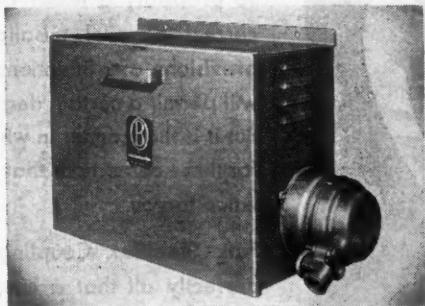
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Electrician's Time Freed
For Other Duties When
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***INVESTIGATE THE
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*Designed by Mining Men to Meet Mine
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**Positive Control and Overload Protec-
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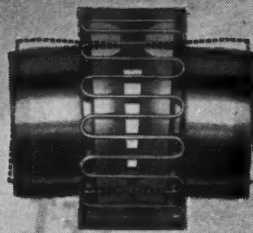
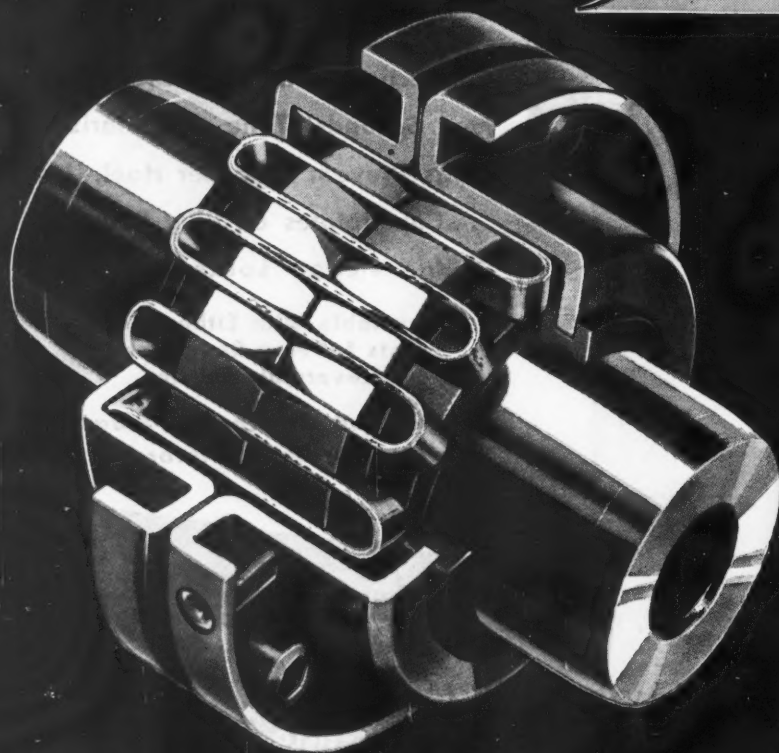
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Canadian Ohio Brass Co. Ltd., Niagara Falls, Ont.

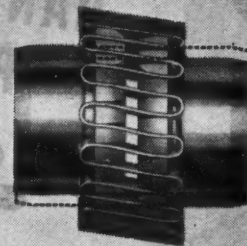
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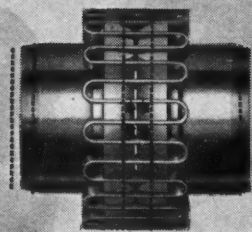
ALL THIS



Angular Misalignment. Under angular misalignment the design of the Falk Steelflex coupling permits a rocking and sliding action of lubricated grid and hubs that allows the greatest freedom of accommodation to angular misalignment, while at the same time transmitting the power through the resilient grid with no lost motion or backlash.



Parallel Misalignment. When parallel misalignment is involved, the resilience of the grid-groove combination comes into full play. The movement of the grid in the lubricated grooves accommodates the misalignment, while still permitting full functioning of the grid-groove action of the coupling in absorbing shock and dampening vibration.



Free End Float. Because the grid member slides freely in the lubricated grooves, the Steelflex coupling permits free and independent end float for the shafts of both the driving and driven members, or of either one. If it is desired that end float be restricted, provision can be made to limit it to any required amount.

Why the Falk Grid-Groove Design Gives you a Plus Value Coupling

Many different kinds of couplings are available. Almost any of them will, to a degree, correct angular misalignment.

To probably a lesser degree, they will correct parallel misalignment, and, if provisions are intentionally made, they will permit a certain degree of end float. But it is the manner in which they provide for these corrections that determines their value to you.

Falk Steelflex Couplings do well-nigh perfectly all that a coupling should do and, in addition, they provide torsional resiliency in addition to flexibility. This is a definite plus value.

IT ALWAYS PAYS TO CONSULT

FALK

...and TORSIONAL RESILIENCE, Too!

Because of the Grid-Groove Design of FALK STEELFLEX COUPLINGS

Here's How It Functions . . . Falk Steelflex Couplings are conspicuous because of their grid-groove design . . . The grid-groove design is the net result of long experience in gear design . . . This is important, because in most cases a coupling is used in conjunction with a driven machine involving the use of gears . . . The long experience of Falk engineers in designing gears has been responsible for coupling design which not

only provides the flexibility long considered essential but also provides the torsional resilience which enables Falk Steelflex Couplings to transmit power smoothly, efficiently, with an almost total elimination of the effects of shock, to dampen vibration, and to cushion the load even under severe peak loads . . . Here is a very simple exposition of how the Falk grid-groove design imparts unusual performance:

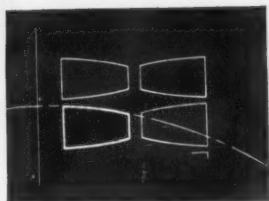


Fig. I

FIG. I. Grooves, in a precise arc, and with a radius and length proportional to the size of the coupling, are cut into two identical hubs of moderately high carbon steel—forged or Falk alloy cast steel . . . **FIG. II.** These grooves provide a snugly fitting slot for a grid member made of chrome

alloy steel with an elastic limit of 180,000 pounds per square inch and an ultimate strength of 220,000 pounds per square inch . . . **FIG. III.** This grid fits snugly into the curved grooves cut into the hubs of the coupling. The grooves provide a scientifically cut bearing surface for

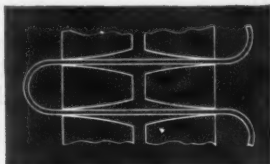


Fig. II

the grid. This bearing surface extends from the outer to the inner edge of the hubs. The grid bears on the grooves in proportion to the load . . . **FIG. IV.** Under light loads, the grid bears only at the outer edges of the grooves. This permits a long, free, elastic span between the

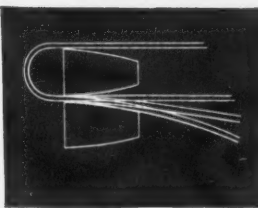


Fig. III

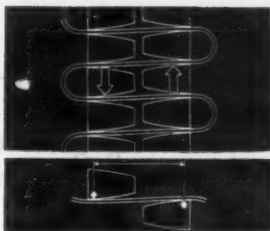


Fig. IV

power without increasing internal stress and maintains its capacity to absorb shocks, dampen vibration and cushion the load . . . **FIG. VI.** Under peak loads, the grid rungs bear over almost all of the curve surfaces of the grooves. The span

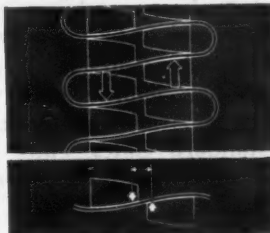


Fig. VI

outer edges of both hubs. Power is transmitted through almost the entire length of the grid rung . . . **FIG. V.** Under normal loads, the grid bears on a larger area of the grooves and the span of the grid rung is automatically shortened as the load increases. It transmits more

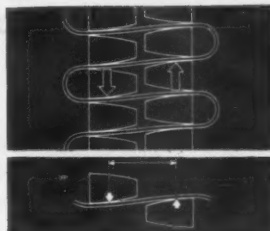


Fig. V

of the grid rung becomes very short; The coupling still remains torsionally resilient. Under the impact of shock loads the grid flexes and continues to transmit power smoothly and efficiently.

There are 13 types and 33 sizes of Falk couplings to meet all requirements. (Get the more detailed information, including Torque Deflection and Stiffness Factor Curves, which is available to you upon request). For specific information and recommendation to meet your needs, call the nearest Falk representative or distributor.

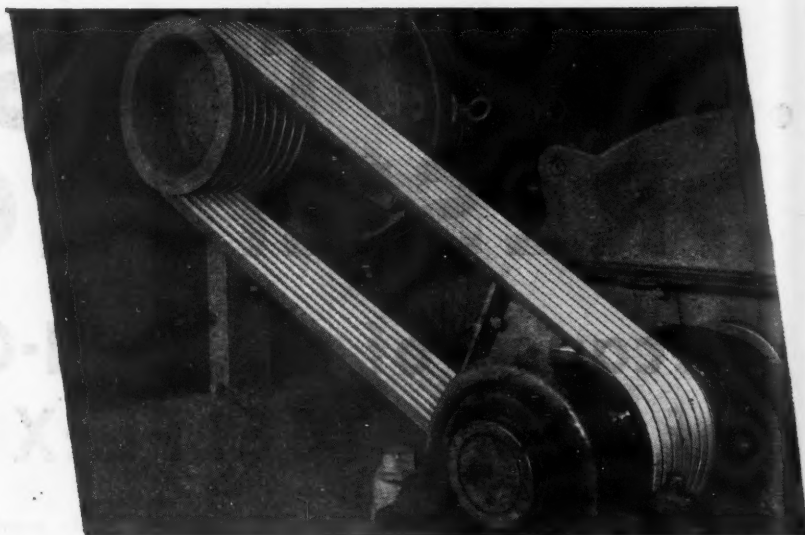
THE FALK CORPORATION, MILWAUKEE 8 | WISCONSIN

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NOW Being Delivered by Your Standard GATES VULCO ROPES!

Here is the Reason:— Good belts were built before the war but none of them had the strength and durability found necessary on army tanks, tractors and self-propelled big guns. Gates developed these greatly superior V-belts for combat service—and here is why this fact is important to you NOW:—

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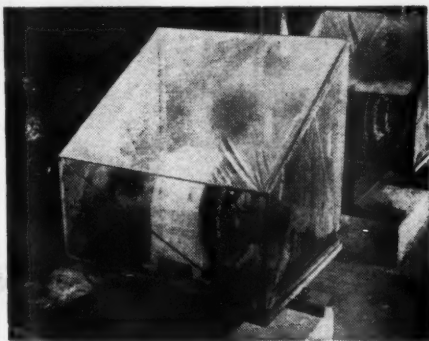
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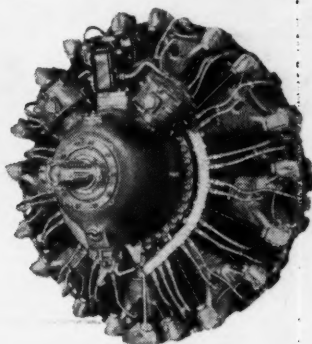
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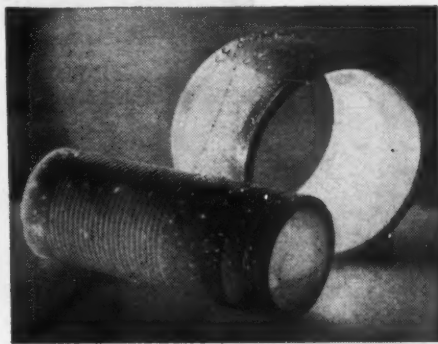
Water repellency is one of the basic properties of Dow Corning Silicone products. Exceptional stability over a wide temperature range is another. These two properties recommend Dow Corning Silicones for the solution of many hitherto insolvable industrial problems involving the exclusion of moisture at elevated temperatures.



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DC COMPOUNDS are heat stable materials easily applied to form a waterproof dielectric seal for disconnect junctions in ignition systems, radio and radar equipment. Non-melting, low freezing properties keep compound where it belongs.



DC FLUIDS, colorless, odorless, inert liquids, form a durable water repellent film over glass and ceramic surfaces to enable insulator bodies to retain their originally high surface resistivity even after immersion in salt water.

DC Silicone Varnishes, Fluids, Greases, Compounds and Rubber (Silastic*) are in commercial production and in general distribution. Inquiries are invited concerning your particular problems involving moisture exclusion, high temperature insulation and special lubrication.

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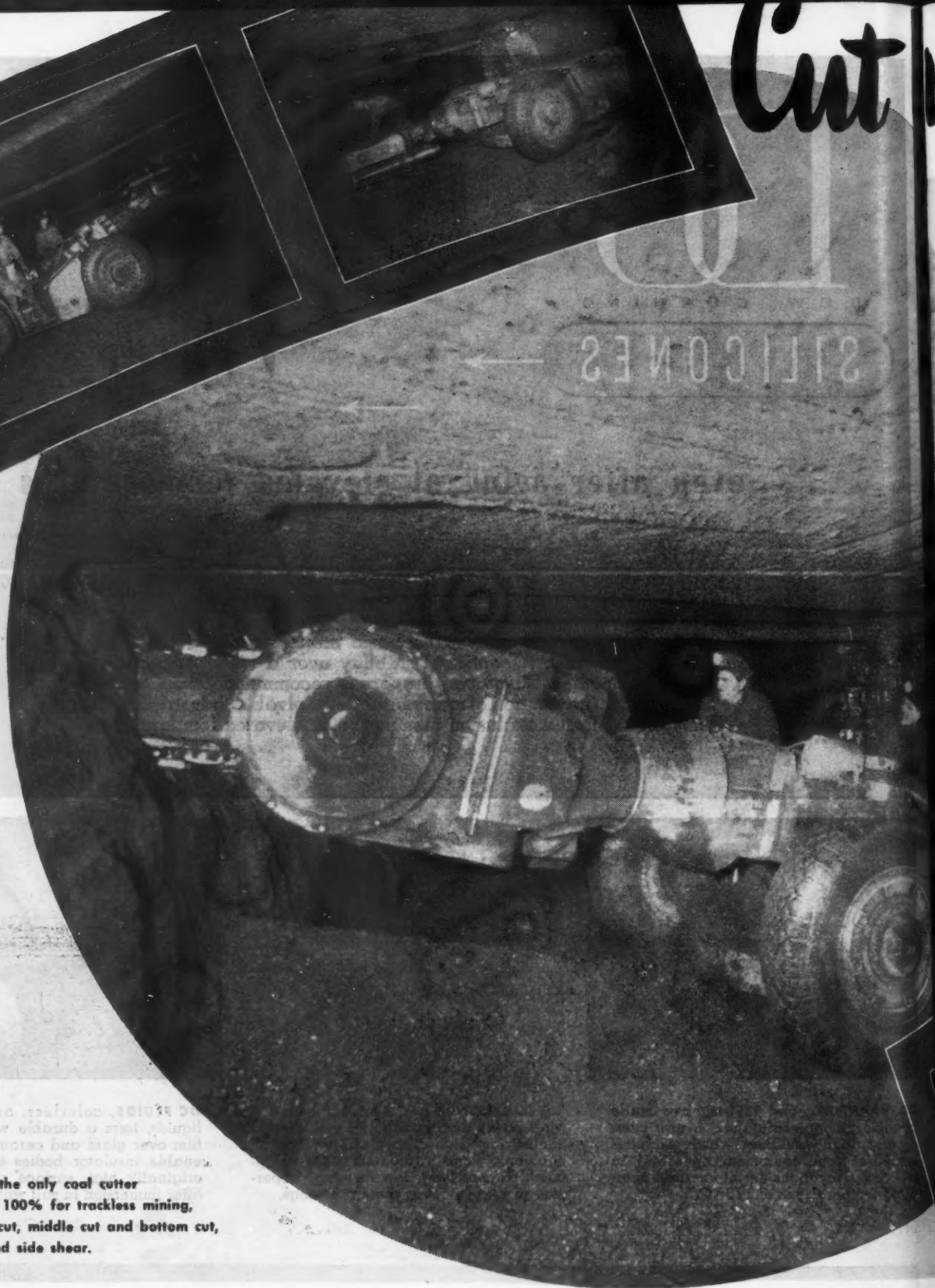
DOW CORNING CORPORATION
MIDLAND, MICHIGAN

New York Office: Empire State Building

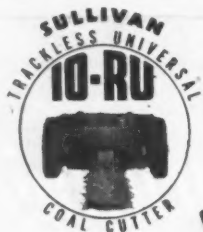
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FIRST IN SILICONES

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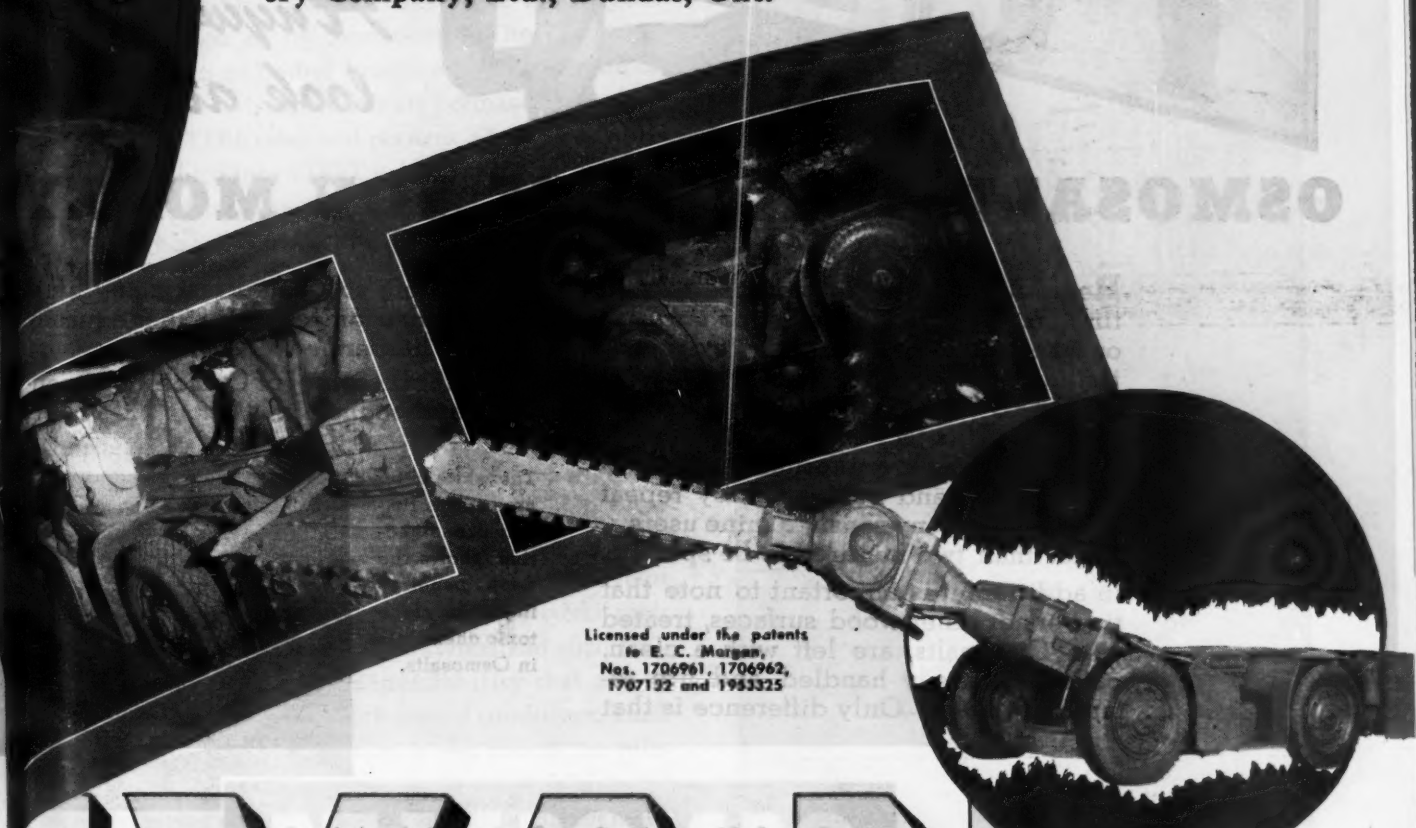
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your coal this modern way

with a SULLIVAN 10-RU trackless cutter

For the answer to their cutting problems, resulting from the higher tonnage obtained in trackless mining, more and more mines are turning to the Sullivan rubber-tired 10-RU Trackless Coal Cutter • The Universal-type 10-RU more than matches the capacity of existing loading machines and gives you the results required to keep your loader operating at top efficiency • Hydraulic drive motors, hydraulic steering, short wheel base, large pneumatic tires, 4-wheel mounting and floating rear axle ensure faster tramming under all mine conditions. Hydraulic controls for all operations result in fast, safe and easy positioning of boom and bar at all times • Your local Sullivan engineer will gladly give you the complete story or show you the 10-RU in action. Ask for bulletin C-33 • SULLIVAN MACHINERY COMPANY. General Offices: Michigan City, Ind. In Canada: Canadian Sullivan Machinery Company, Ltd., Dundas, Ont.



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*Anyway you
look at it...*

OSMOSALTS WILL SAVE YOU MONEY

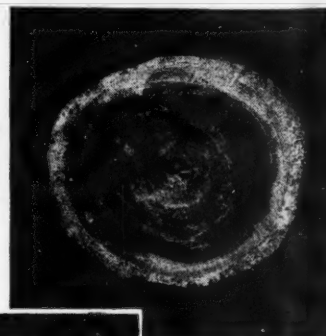
Regardless of whether you use treated timbers in small quantities or large... or whether you treat your own or buy timbers already treated... OSMOSALT-TREATED TIMBERS WILL SAVE YOU MONEY. This fact has definitely been proven in many authoritative and unbiased tests, and best of all, by repeat orders from many satisfied mine users... better than two hundred to be specific.

In addition, it is important to note that timbers or other wood surfaces, treated with Osmosalts, are left with a clean, paintable, easily handled and fire retardant surface. Only difference is that

the timbers so treated last many times longer than untreated or inadequately treated timbers.

Write for the proof of Osmosalts superiority and economy.

The white outer area of this timber cross-section, shows the deep penetrating action of the toxic chemicals in Osmosalts.



OSMOSALTS

Nature's Method of Wood Preservation

Composition and Process Patented and Patents Pending

OSMOSE WOOD PRESERVING COMPANY OF AMERICA, INC.

GENERAL OFFICES: BUFFALO 12, N. Y.

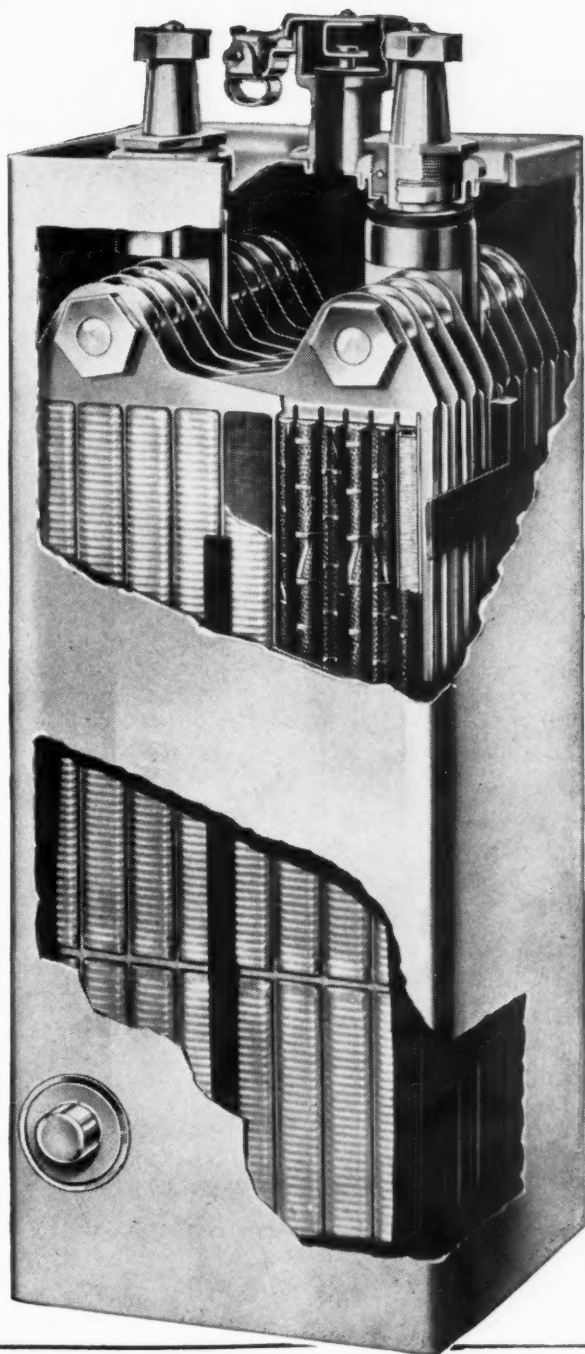
BRANCH AND SALES OFFICES: BIRMINGHAM 3, ALA.; DENVER 2, COLO.; BECKLEY, W. VA.; HARLAN, KY.

MOST **RUGGED** OF ALL

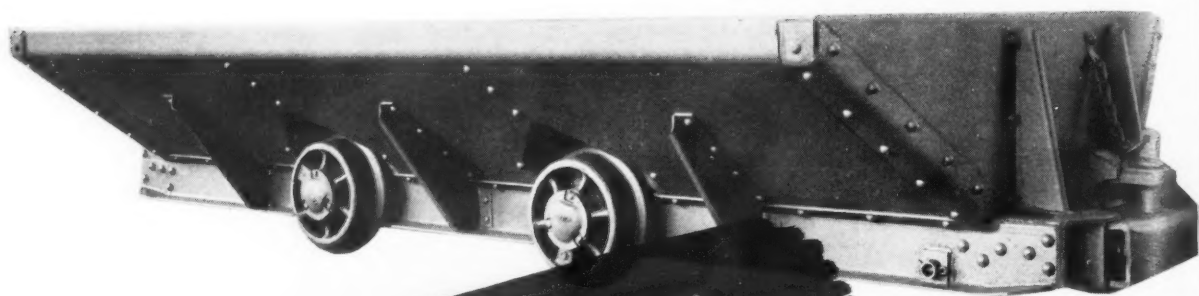


Here is a cut-a-way view of a single cell of a typical Edison Alkaline Battery for operating electric trucks in industrial material-handling services. Note the ruggedness and precision of its construction. The container, cover, pole pieces and other structural parts are made of STEEL. Even the active materials are permanently locked in perforated STEEL tubes and pockets. These in turn are securely assembled into STEEL grids to form the positive and negative plates. The STEEL cover is welded onto the container. This cell construction is entirely different from that employed in other types of storage batteries . . . and every difference is an advantage to users of alkaline batteries in industrial trucks.

Because of their STEEL construction, they are by far the most rugged and durable of all batteries. When it comes to standing up under the shocks, vibration and hard usage in material-handling services, they have no equal. Alkaline batteries in trucks have fallen off loading platforms and docks, turned over, and even dropped down elevator shafts with little or no damage . . . and still delivered their full service life. The fact they can withstand such accidents, indicates the extra dependability that can be expected from them under more normal conditions. Their durable mechanical construction is also one of the principal reasons why alkaline batteries stay on the job and out of the repair shop, give longer life, and help cut material handling costs. *Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J.*



Edison
ALKALINE-BATTERIES



Put war-worn mine cars
on your honorable discharge

With every machine or conveyance there comes a time when dollars and cents say that a new replacement is more economical to operate — and mine cars are no exception.

You know from your own operations the tremendous demands that the war has placed on your equipment. You know that in the postwar battle for business you will want the most efficient rolling stock to keep costs down.

Talk over your needs with an A.C.F. mine car representative — early. Ask him to go over your cars, sit down with your people and make suggestions. His services will prove invaluable in helping you decide whether new cars are indicated NOW or LATER — what type the cars should be for your most profitable operation — whether parts replacement alone might be sufficient. Over the years, at mine after mine, this personalized service has helped lower production costs.



A.C.F. Chilled Tread
Mine Car Wheels, as
manufactured under our
heat-treating process, are
made from a special mix-
ture of metals — better for
mine car wheels than steel
or iron, alone.

AMERICAN CAR AND FOUNDRY COMPANY

A.C.F. NEW YORK • CHICAGO • ST. LOUIS
CLEVELAND • PHILADELPHIA
BERWICK, PA. • PITTSBURGH • HUNTINGTON, W. VA.

Each a Champion in its Class

WALWORTH PIPE WRENCHES



These three Walworth pipe wrenches are "tops" in the field. All are famous for their safety, strength, simplicity of operation — and ability to "take it" under extraordinary conditions.

1. WALWORTH GENUINE STILLSON

*Made to Federal Specifications
GGG-W-651a*

*For Type I Normal Duty Adjustable
Pipe Wrenches*

A standard of quality since 1869. Known the world over as the handiest tool in the pipe fitter's kit. Sizes from 6 to 48 inches.

2. WALWORTH WALCO PIPE WRENCH

*Made to Federal Specifications
GGG-W-651a*

*For Type II Heavy Duty Adjustable
Pipe Wrenches*

The world's strongest pipe wrench. Features a renewable lower jaw, easily renewed when worn... thus indefinitely extending service life. Has only six parts — all forged steel. Sizes 6 to 48 inches.

3. WALWORTH PARMELEE

*Made to Federal Specifications
GGG-W-651a*

For Type IV Girth Pipe Wrenches

For brass and plated pipe. No teeth — grips like the human hand. Will not scratch or mar. Particularly useful in close-quarter work. Made in 4 sizes for $\frac{3}{8}$ to 4 inches I.P.S. Girths in special O.D. sizes available.

For full data regarding these three pipe wrenches, see your Walworth distributor — or write for a free copy of Walworth Catalog 42. In addition, the catalog describes Walworth's complete line of steel, iron and bronze valves and fittings.



14 AWARDS
TO 4 PLANTS

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

*Easy to Find...
Easy to Order*



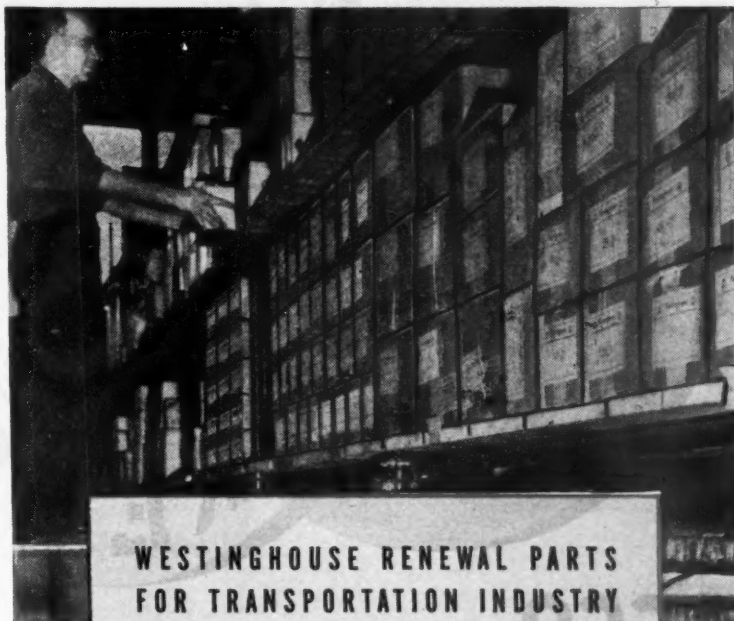
**WHEN YOU NEED RENEWAL PARTS FOR TRANSPORTATION ELECTRICAL EQUIPMENT...
USE THE WESTINGHOUSE RENEWAL PARTS SYSTEM...EASY TO FIND...EASY TO ORDER**

just refer to your Westinghouse Catalog Information or Stock Recommendation Sheets, which include complete data, conveniently indexed.

Remember, when you order Westinghouse Renewal Parts, you receive a part incorporating the latest design and improvement : : : interchangeability : : : and ease of installation.

There are 17 Westinghouse Renewal Parts warehouses strategically located throughout the country, completely stocked for your convenience. The 34 Westinghouse repair plants are also available for repairs to your electrical apparatus.

Call your nearest Westinghouse office or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-15104-A



**WESTINGHOUSE RENEWAL PARTS
FOR TRANSPORTATION INDUSTRY**

- Armature and Field Coils
- Shafts and Bearings
- Brushes and Brushholders
- Commutators and Assembled Segments
- Control Parts
- Control Accessories
- Control Switches
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Westinghouse
PLANTS IN 25 CITIES... OFFICES EVERYWHERE

Renewal Parts



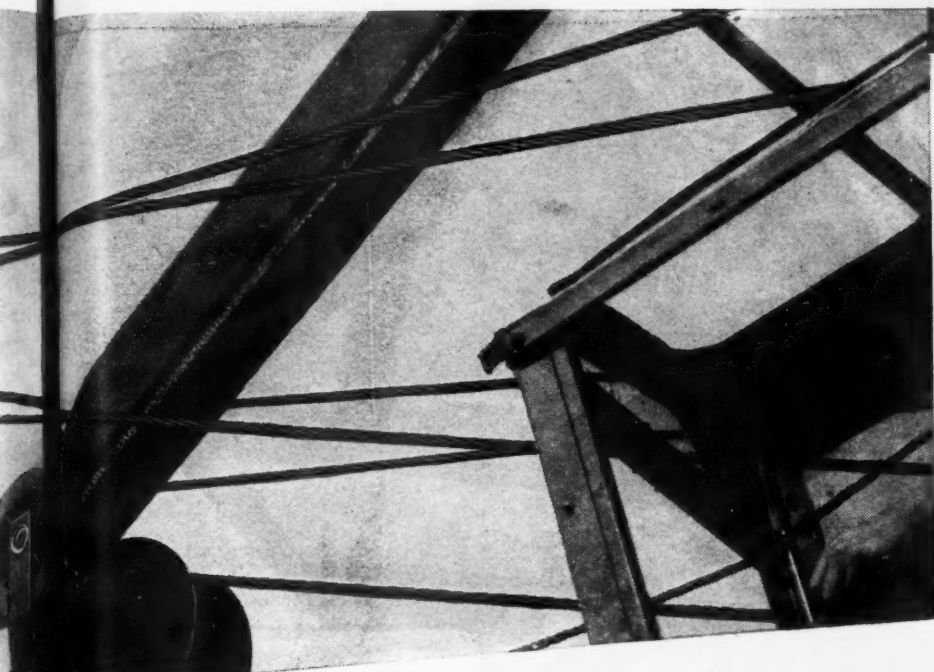
ACCO



Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma, Bridgeport, Conn.

**HAZARD WIRE ROPE DIVISION
AMERICAN CHAIN & CABLE**

In Business for Your Safety



IT'S ALL *GREEN* NOW IT'S BETTER THAN EVER *LAY-SET* PREFORMED I.P.S.*

● **LAY-SET** Preformed Improved Plow Steel* has always been Hazard's highest quality rope. Now it is better than ever, because every strand is packed with **GREEN-LUBE**—a superior, more adherent lubricant. This All-Green **LAY-SET** Preformed will last longer, give better service. **GREEN-LUBE** is a more costly lubricant—but not to you. It is Hazard's assurance that when you specify **LAY-SET** Preformed Improved Plow Steel you ask for the best there is in wire rope.



geport, Co

KATHANODE

*Glassklad
since
1925*



GOULD

PIONEER OF GLASSKLAD CONSTRUCTION

GOULD STORAGE BATTERY CORPORATION

Depew, N. Y. Factories: Atlanta • Chicago • Dallas • Depew • Leavenworth • Los Angeles • North Bergen • Rock Island • St. Paul • Sioux City • Zanesville

DURAPOR (Rubber)
SEPARATOR
•
UNIT-SEAL (Rubber)
ENVELOPE
•
SPUN GLASS
RETAINER MAT
•
BLACK OXIDE
ACTIVE MATERIAL
•
KATHANODE
POSITIVE GRID

First American battery to use glass protection, Kathanode has had twenty years of unqualified success in powering mine locomotives. Behind it are two decades of constructive research—research that has developed:

Kathanode grid, exposing a minimum of surface area yet with ample cross-section for electrical conductivity.

Black Oxide, the unique active material with the regenerative pure lead core.

Spun glass mat, of exclusive layered design that positively retains useful active material.

Unit-Seal envelop, with open ends and solid edges to prevent treeing of spent material.

Durapor separator, of deeply ribbed and highly porous rubber construction, with high mechanical strength.

This research is constant; so look to Gould for leadership in storage battery developments.

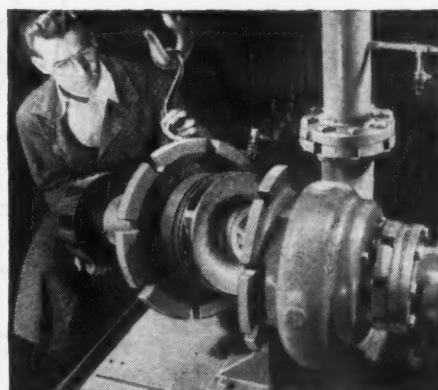
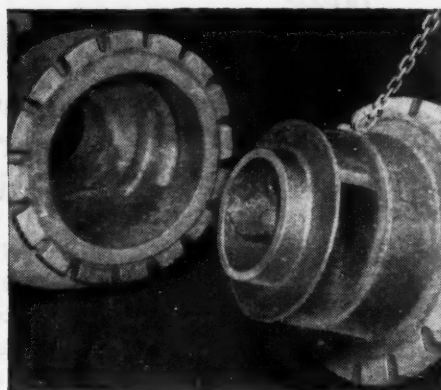
To the advantages of electric mine locomotives, add Kathanode, the best battery power for propulsion. Write Dept. 109 for Catalog 200 on Kathanode Glassklad Batteries for Mine Locomotive Service.



**2 to 4
Times**

LONGER LIFE

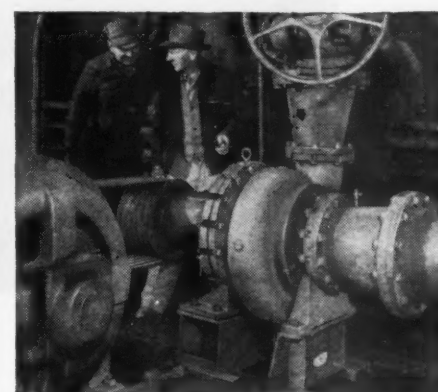
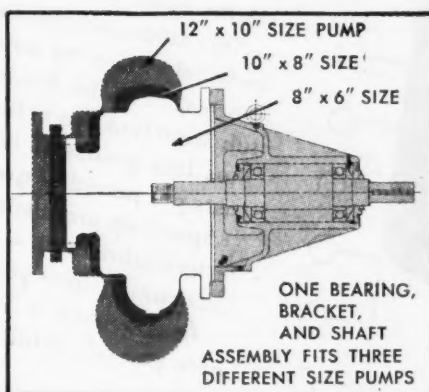
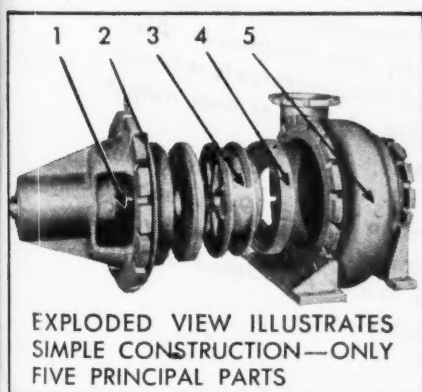
*With A-C's Great New "Solids-Handling" Pump
—That Cuts Parts Inventory as Much as $\frac{2}{3}$
—And Materially Reduces Down-Time!*



1 Continuing research plus field reports *prove* that *new* design and *special* alloys increase pump life 200 to 400%! Here, an impeller is weighed after test run to determine loss by abrasion. For *more* proof...

2 In a coal plant this 10" x 8" pump handled high percentages of solids for 150 days. Dismantled, it showed only *negligible* signs of wear. This plant is *sold* on long life, low down-time — but that's not all...

3 They like the *simplicity* of this new pump... fact that they can remove *entire* rotating element without disturbing suction or discharge piping. And that means *ease of accessibility*. It also means...



4 Where a *number* of pumps are used, parts inventory can be reduced much as $\frac{2}{3}$; and *materially*, where only 1 or 2 are used. One reason: this pump has up to 50% *fewer* parts than other pumps. Another...

5 Comparable size pumps of different ratings have interchangeable parts. Example: 8x6, 10x8, 12x10 sizes have *same* bearings, bracket, shaft assembly. You stock 1 set of parts for 3 pumps! Adding 'em all up you get...

6 Longer life, fewer parts, less down-time—*lower cost per ton of solids handled than with other makes!* What's more, A-C's "Solids-Handling" Pump compares favorably in price with ordinary high efficiency pumps.

A 1911



WANT MORE FACTS? Call this experienced engineer in your nearby A-C district office. Discuss your pumping problem with him. Or, Write direct for Bulletin B6381. ALLIS-CHALMERS, MILWAUKEE, WIS.

ALLIS-CHALMERS
"Solids-Handling" Pumps

S-M-O-O-T-H PERFORMANCE...

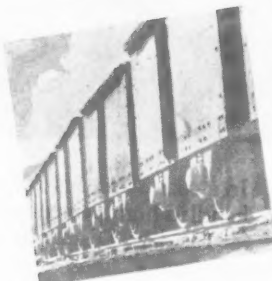


**DRUMS!
DRUMS!
DRUMS!**

War needs make it imperative
that all empty drums be re-
turned immediately.

New **TYCOL #19 Grease**

**Expressly engineered for
lower cost...more efficient
mine car operation**



With new Tycol #19 Grease, your troubles caused by changes in atmospheric temperature — in or out of the mine — can be virtually eliminated . . . for Tycol #19 has been scientifically compounded from

selected crude stocks to assure maximum lubricating results down to 0° F — and lower.

This means elimination of low temperature drag, definitely lowering power requirements, permitting more cars to be hauled by one locomotive. Also, lubricant leakage at higher temperatures is reduced, thus less grease is needed . . . lower coal output costs per pound of grease.

Speed up production . . . avoid the delays of ineffective lubrication — turn to Tycol #19 . . . the right lubricant to save you time, trouble and money.

Ask to have a Tide Water Associated engineer give you full details today.



TYCOL INDUSTRIAL
ENGINEERED FOR EVERY

M-A-X-I-M-U-M EFFICIENCY

with **TYCOL**

ENGINEERED LUBRICATION

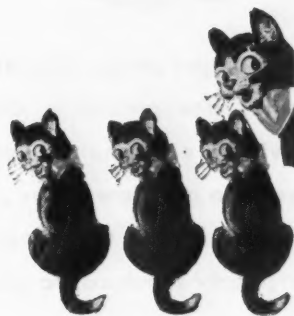
Under all conditions the proved performance of Tycol lubricants more than meets their recommended service.

Rigidly controlled and tested during manufacture . . . and refined from the highest grade crudes, Tycol oils and greases (whether straight mineral or compounded) retain their uniformity* within each classification — from the first drum to the last. This unvarying high quality, plus the scope of the line, accounts for Tycol's wide acceptance among operators interested in maximum production . . . top efficiency . . . lowest operating cost.

Whatever your lubrication need, there is a Tycol oil or grease expressly engineered to afford greater economy . . . longer machine life for every type of equipment. Let a Tide Water Associated engineer help you select the best one for your particular need. Call, write or wire your nearest Tide Water Associated Office for full details.

Makers of Famous Veedol Motor Oil

* **UNIFORMITY.** For clear, concise descriptions of the basic tests used to determine important lubrication properties — Pour Point, Extreme Pressure, Uniformity and many others — consult Tide Water Associated's informative handbook "Lubricania". For your FREE copy write: Tide Water Associated Oil Company, 17 Battery Place, New York 4, N. Y.



LUBRICANTS
SERVICE NEED



**TIDE WATER
ASSOCIATED
OIL COMPANY**

17 BATTERY PLACE • NEW YORK 4, N. Y.

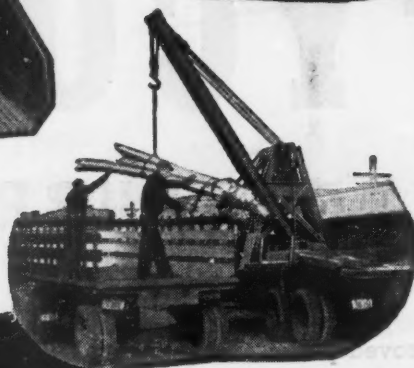
PRINCIPAL OFFICES
BOSTON • PHILADELPHIA
PITTSBURGH • CHARLOTTE, N. C.



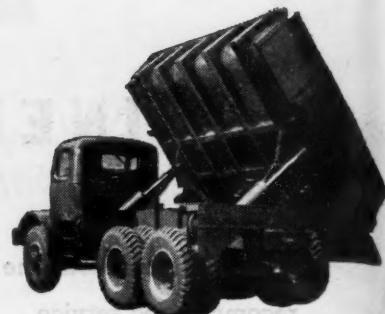
X-112 Body and T-4440 Hoist. Scoop end or automatic downfold tailgate.



West Coast Special, W-12 Body and F8C Cam and Roller Hoist.

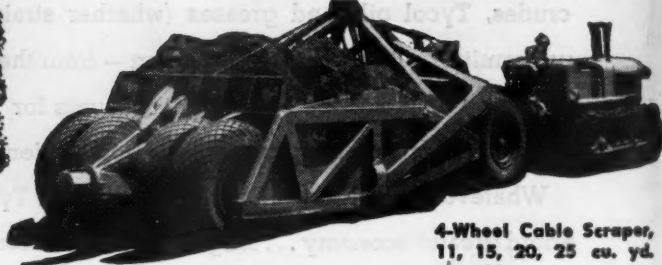


12,000—Series Crane, 10-ton capacity.



One-way Side Dump, Dual Hydraulic Hoist. Automatic downfold side.

STILL GOING STRONG
... Because They're Designed and Built by GAR WOOD



4-Wheel Cable Scraper, 11, 15, 20, 25 cu. yd. capacities.

Prolonged production of wartime necessities has placed a strenuous test on civilian equipment. Replacements are hard to get nowadays . . . impossible in some cases. It takes superb equipment, properly serviced, to successfully bridge the gap between prewar and postwar supplies. Gar Wood equipment is well

known for its ability to deliver rugged, dependable day-in, day-out performance. That reputation was not easily won. Present-day owners of Gar Wood equipment know that it was designed and built to last a long time . . . to get work done quickly and efficiently without babying and constant attention.

SUPPORT THE THE 7TH WAR LOAN . . . BUY MORE BONDS

GAR WOOD INDUSTRIES, INC.

DETROIT 11, MICH.

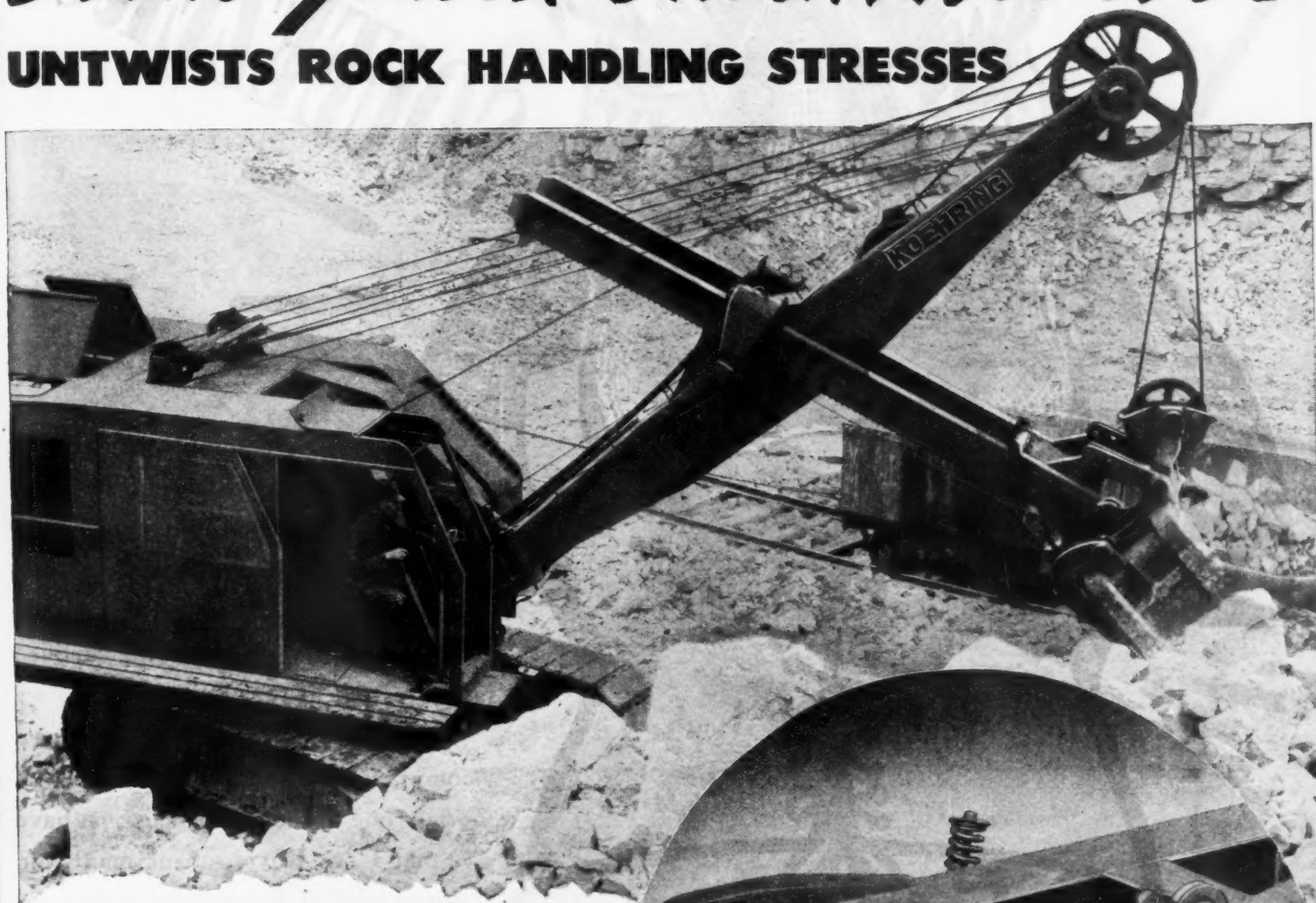
WORLD'S LARGEST MANUFACTURER OF TRUCK AND TRAILER EQUIPMENT



HOISTS AND BODIES • WINCHES AND CRANES • TANKS • ROAD MACHINERY • HEATING EQUIPMENT • MOTOR BOATS

"Boom Guard" Shock Absorber

UNTWISTS ROCK HANDLING STRESSES



YOU CAN'T JAR THE 605 BOOM!

Because the Koehring "Boom-Guard" Shock Absorber takes the jar out of rock shock loading. Heavy coil springs ride out twisting strains of "sweeping up," cushion bending strains when the dipper hits a tough spot in the cut, absorb all the stresses that injure unprotected booms or dipper sticks.

WHY A SHOCK ABSORBER ?

Why a shock absorber on a boom that's already plenty strong? Because there may be times, particularly in rock, when even the toughest boom takes it on the chin. That's why it's smart to buy the Koehring 605 with the boom that's shock absorber protected.

BOOM REMAINS RIGID!

Because the Koehring 605 "Boom-Guard" Shock Absorber is correctly spring-loaded, you sacrifice not a bit of the rigidity you want for perfect control. No spring, no bounce, no sway, but full protection when you need it.

KOEHRING COMPANY • MILWAUKEE 10, WIS.



ASK FOR YOUR 605
CATALOG TODAY



HEAVY-DUTY CONSTRUCTION EQUIPMENT



SQUEEZEROO

Any resemblance between the agonies of this hefty belle and the punishment that U. S. Royal Cords and Cables must take in the laboratory before being certified "safety-tested" is purely intentional.

The "squeezeeroo"—as gruelling a compression test as we can devise—is only one of the assurances you have that U. S. Royal means maximum dependability. Rigorous trials by heating, freezing, stretching, and bending must also be successfully weathered by U. S. Royal Cords and Cables—so you can be sure they'll do the job you have in mind—whatever the conditions.



THE NEW U. S. ROYAL *Safety Tested*

MINING MACHINE AND LOCOMOTIVE CABLES

UNITED STATES RUBBER COMPANY

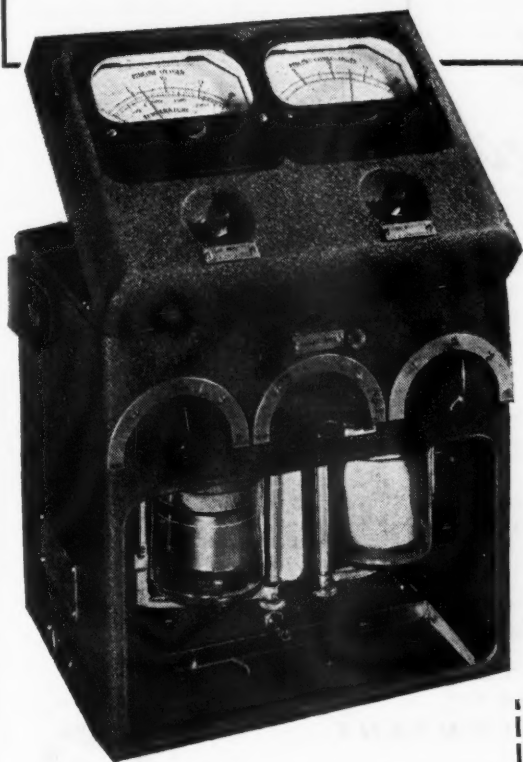


1230 SIXTH AVENUE • ROCKEFELLER CENTER • NEW YORK 20, N. Y.

SERVING THROUGH SCIENCE WITH ELECTRICAL CORDS AND CABLES

CAN YOU ANSWER THESE 3 QUESTIONS?

1. How efficiently do your boilers or furnaces burn fuel?
2. How accurately can your operators control fuel combustion?
3. What have wartime overload conditions done to your fuel consumption?



If you can't answer these questions, you can find your answers—in just a few minutes—with the Cities Service Industrial Heat Prover.

This unique instrument, exclusive with Cities Service, registers quickly and continuously the per cent of oxygen and combustibles present in the escaping gases or in the furnace atmosphere. Shows you how to burn fuel efficiently and economically.

Invaluable for checking furnace atmospheres in the heat treatment of metals.

This instrument represents just another contribution by Cities Service to wartime conservation of critical material.

Take advantage of the free demonstration offer on your own equipment...at no obligation.*

Mail this coupon today for further information

Cities Service Oil Co.

Room 406 70 Pine Street, New York 5, New York

Gentlemen: Please send me further information on your free demonstration offer of the Cities Service Industrial Heat Prover—at no obligation to me.

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Company

Address

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CITIES SERVICE OIL COMPANY

ARKANSAS FUEL OIL COMPANY



It's TIGER BRAND for Tonnage

YOU CAN get out more coal or ore when you operate your mining equipment with U.S.S. American TIGER BRAND Excellay Preformed Wire Rope.

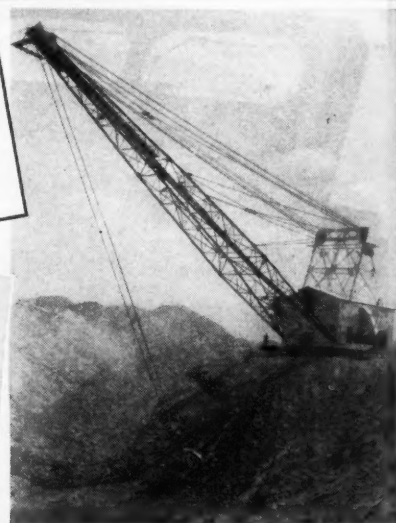
For inclines, shaft hoists, shovels, draglines—in underground or stripping operations—this superior line has what it takes to get it out faster, more efficiently.

Strong, tough, flexible TIGER BRAND Excellay Preformed

Wire Rope is highly resistant to bending fatigue and wear. It runs smoothly over small sheaves—does not rotate in the grooves. It spools evenly on the drum.

TIGER BRAND Excellay Preformed Wire Rope is easier to handle, too, because it has no tendency to kink. Crown wires lie flat and in place even when broken . . . do not wicker out to tear the skin or clothes of handlers.

*Excellay
Preformed*



AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

COLUMBIA STEEL COMPANY

San Francisco

United States Steel Export Company, New York

UNITED STATES STEEL



**U.S.S. AMERICAN
TIGER BRAND**

*Wire
Rope*

To help you avoid deposits in compressors

CONDITIONS under which compressors operate, particularly under today's heavy loads, tend to cause excessive deposits.

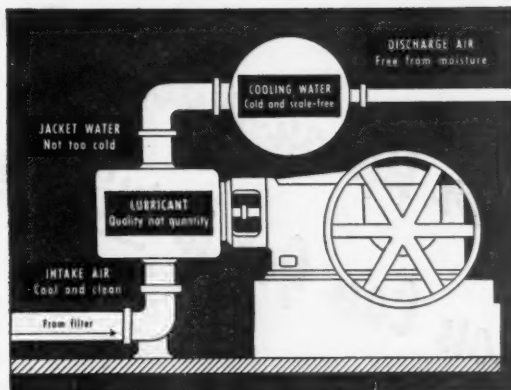
Improper lubrication is not always responsible for these deposits, but a compressor lubricant with the right qualities can reduce or eliminate many of them. Stanoil is such a lubricant.

The causes of some of the more common compressor operating problems and suggested cures, as well as the advantages of Stanoil, are listed on this page.

A Standard Oil Lubrication Engineer will be glad to help you apply the right grade of Stanoil to overcome excessive deposits and wear on your compressors. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for the Engineer nearest you.

STANOIL

Buy more War Bonds



Causes and Cures

Valve Deposits—Oxygen in the air and heat generated by compression tend to oxidize conventional oils, causing the formation of carbon and asphaltic substances which deposit on valves.

To avoid oil oxidation, keep intake air temperatures as low as possible. Be sure inter-coolers and after-coolers are supplied with an ample supply of cool water, and keep them free from scale and rust. Use Stanoil, from which the unstable hydrocarbons—those affected by heat and oxygen—have been removed, thus eliminating many troublesome deposits at the source.

Dirty Intake Air. The enormous volume of air required by compressors may introduce a large quantity of dirt and dust which contributes both to excessive wear and deposits. Use efficient air screens and keep them clean. Be sure they are not located near a source of dirty air. Use Stanoil which resists the formation of gummy deposits that might collect dirt and dust and add to deposits on valves.

Condensation in Inter-Coolers. Water in the inter-cooler should be cold enough to condense oil and moisture in the compressed air so that they can be removed before entering the high pressure cylinders where they might cause excessive deposits.

Over-Lubrication. Oil is not burned up in compressors as it is in internal combustion engines, nor is it washed away as it is in steam engines. Oil remains in the compressor cylinder, and if it is of the right quality, very little is needed. An excessive amount of oil increases the possibility of deposits in valves, inter-coolers and air lines. Compressors usually require from 1/5 to 1/10 as much oil as steam cylinders of similar size. Because of the high lubricating quality of Stanoil, only a very small amount is needed to secure adequate lubrication.

STANDARD OIL COMPANY (INDIANA)

STANDARD
SERVICE

★ LUBRICATION ENGINEERING

Order Upson-Walton Brattice—
You Can Get it Without Delay!

UPSON-WALTON brattice cloth is absolutely dependable brattice cloth. It is the product of no speed-up processing; Upson-Walton takes time to be thorough in manufacture—hence every piece of U-W brattice you buy is *absolutely flame-proof!*

Upson-Walton brattice is made from long fibre, twisted jute yarn for extra strength. It is closely woven to exclude gases and dust and retain air.

Best of all, you can now get it without any delay—orders can be filled from stock on the following:

U-W 9626—medium weight, single warp cloth.

U-W 8372—heaviest single warp cloth available, for use where operating conditions are severe.

Widths: 36", 42", 48", 60", 72", 84", 96".



Established 1871

NOTE: U-W 5071—medium heavy, single warp—and U-W 2098—extra heavy double warp are now unavailable due to wartime restrictions. They will be returned to the Upson-Walton line just as soon as it is possible for us to make them.

THE UPSON-WALTON COMPANY

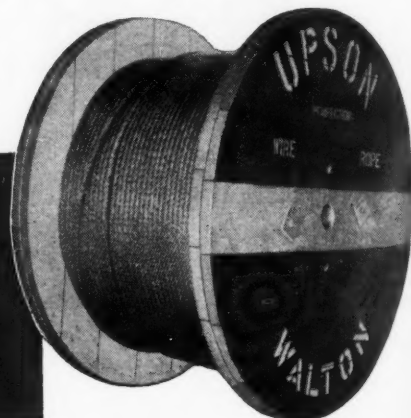
Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks

MAIN OFFICES AND FACTORY: CLEVELAND 13, OHIO

114 Broad Street
New York 4

737 W. Van Buren Street
Chicago 7

241 Oliver Building
Pittsburgh 22



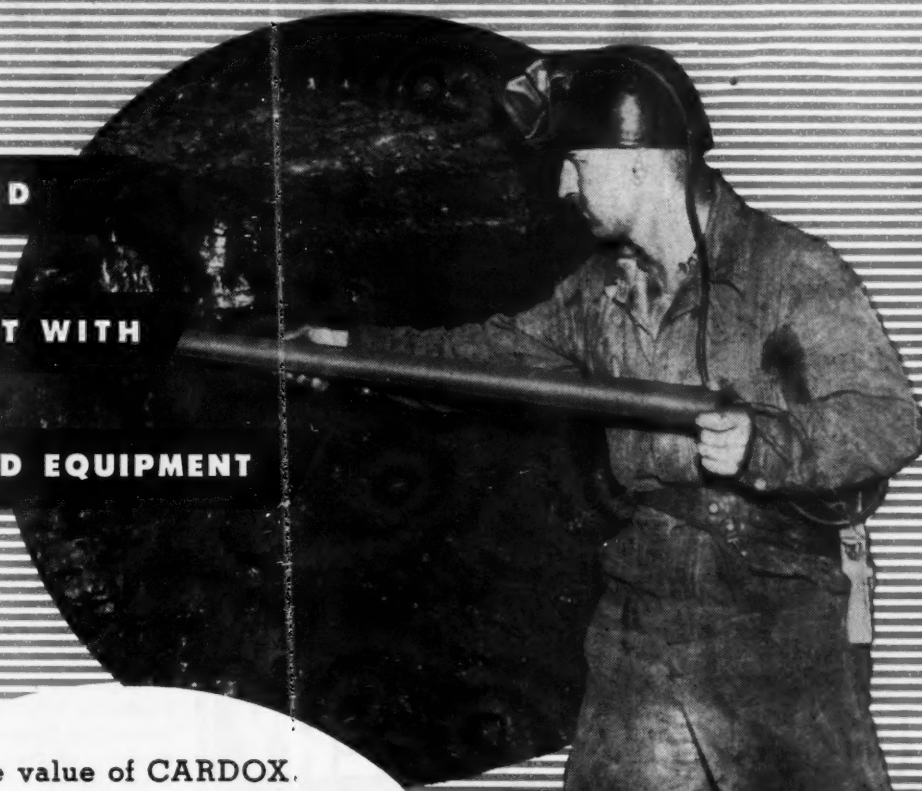
CARDOX

"THE NON-EXPLOSIVE MINING METHOD"

FOR MORE AND

BETTER OUTPUT WITH

ALL MECHANIZED EQUIPMENT

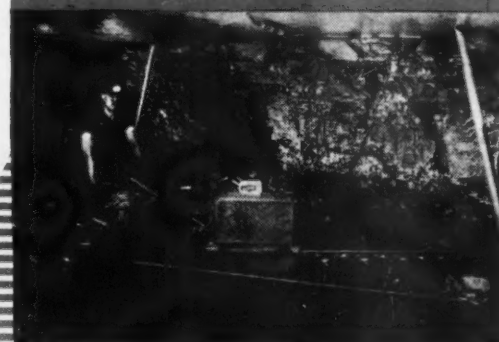


The value of CARDOX in making the most of mechanized equipment extends over practically every phase of production. Longer cutter bars can be used when the face is broken down with CARDOX... providing more coal per face for the loading machine. Loading is faster... and the loader is subjected to less wear... because the slow heaving action of CARDOX rolls the coal forward in a loose pile. The higher percentage of coarse sizes produced by the gentle heaving action of CARDOX makes possible substantial savings in cleaning time and cost. ¶ The CARDOX Mining method involves no radically new procedure. In fact, it makes possible maximum output with a minimum of skill and manpower. Write for full details on free demonstration in your own mine.

CARDOX

Hardrock Drilling Equipment

Complete line of drilling equipment designed to give you the maximum in drilling efficiency



CARDOX CORPORATION • BELL BUILDING • CHICAGO 1, ILLINOIS



Gar Wood Cable Doze-caster speeds coal stripping operations.

Efficiency Boosters for Open Pit Mining

**GAR WOOD
ROAD MACHINERY
WITH ALLIS-CHALMERS DIESEL POWER**

The increasing use of Gar Wood earth moving equipment in open pit mining is one of the highlights of present trends toward greater efficiency in the production of coal and ores.

A large and steadily growing volume of Gar Wood Hydraulic Bulldozers and Trailbuilders, Cable Doze-casters and Scrapers is being used to boost the productivity of drag lines, power shovels and trucks. These Gar Wood units speed up the moving of overburden—clean surfaces of coal seams—level off spoil—build roadways so trucks may roll at full speed. Rugged, dependable and trouble-free, Gar Wood equipment is particularly well adapted to mining operations, as shown by repeat order after repeat order from satisfied users. Boost your production efficiency this proved way. Order Gar Wood Road Machinery from your Allis-Chalmers dealer.



20 cu. yd. Gar Wood Cable Scraper moves overburden.

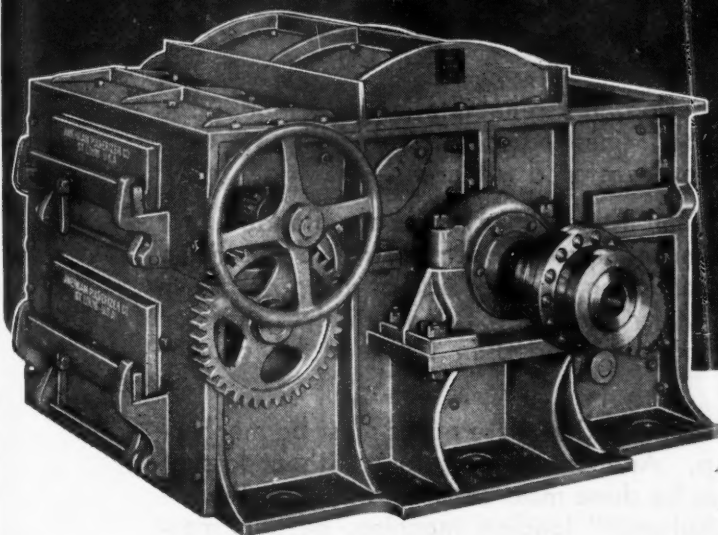


GW ROAD MACHINERY
is Sold Through
ALLIS-CHALMERS
Dealers Everywhere

ROAD MACHINERY DIVISION

GAR WOOD INDUSTRIES, Inc.
DETROIT 11, MICHIGAN

OTHER PRODUCTS OF GAR WOOD INDUSTRIES INCLUDE HOISTS AND BODIES • WINCHES AND CRANES • TANKS • HEATING EQUIPMENT • MOTOR BOATS



American "AC".



PATENTED MANGANESE STEEL SHREDDER RINGS

These Shredder Rings are reversible and have 20 cutting edges. Clogging is averted even with a wet product. Revolving at low speed and with terrific centrifugal force, each shredder ring revolves free on its shaft. In contact with tramp metal, it deflects unharmed.

safety devices that require attention.

The Great Efficiency of American Shredder Ring Action Results in Greater Tonnage with No Oversize and Complete Control of Fines

These Shredder Rings are reversible and have 20 cutting edges. Clogging is averted even with a wet product. Revolving at low speed and with terrific centrifugal force, each shredder ring revolves free on its shaft. In contact with tramp metal, it deflects unharmed. No shear pins or conventional safety devices that require attention.

American Rolling Ring Crushers as a one step operation, or in circuit, assure high tonnage production with a great range of reduction down to uniform stoker size with a minimum of fines or to commercial screenings with controlled fines.

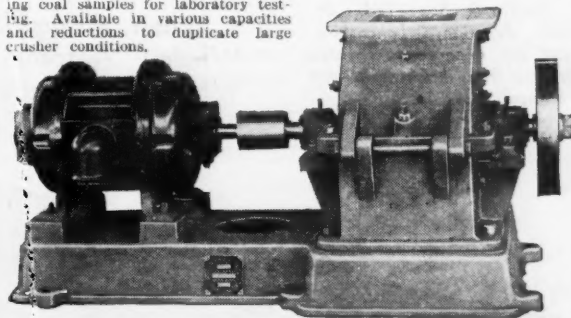
Sizes are accurately governed by the simple external adjustments of the grinding plate and cage. All crushing parts and chamber are of manganese steel.

Heavy alloy steel rotor shaft has anti-friction bearings mounted in grease lubricated, dust-tight pillow blocks. Crusher housing sections have machined, dust-tight joints.

Tonnages up to 500 TPH are consistently and economically maintained with an operating cost of less than 1c per ton.

Shredder Ring LABORATORY CRUSHER

Ideal small crushing unit for preparing coal samples for laboratory testing. Available in various capacities and reductions to duplicate large crusher conditions.



Send for Informational Literature and Specifications

American

PULVERIZER COMPANY

*Originators and Manufacturers of
Ring Crushers and Pulverizers*

1119 MACKLIND AVE.
ST. LOUIS 10, MO.



The Loader With the Natural, Smooth Easy-Shovel-Action Loading Head

The War Areas Aren't The Only Post-War Cleanup Jobs!

● In the post-war period, the rehabilitation and modernization of American Coal Mines is just as surely a "must" as is the cleanup job in the devastated war areas.

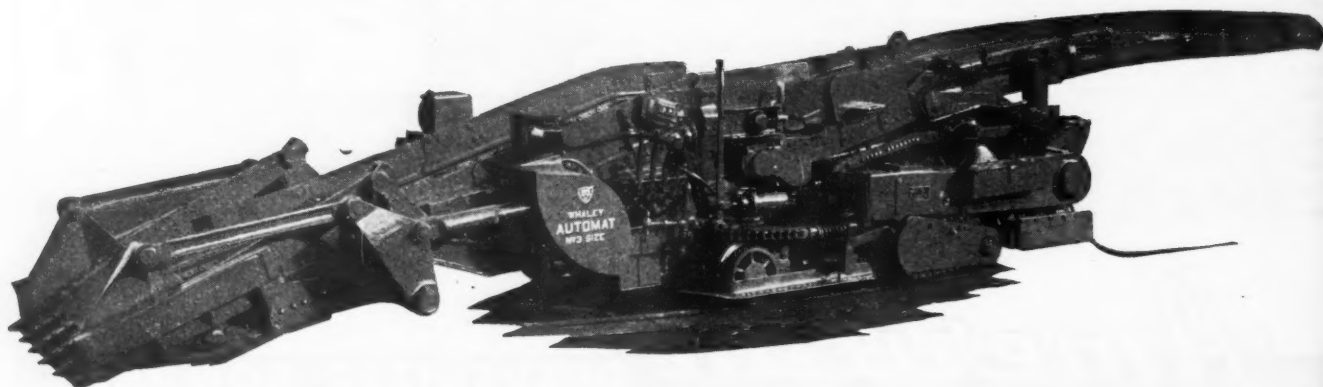
Of course, American Mines have not been flooded, nor have shafts and mining equipment been destroyed by armed enemies, but over-production and shortage of manpower have taken a heavy toll. Many mines now find themselves short on development, with pillars wrapped in falls and air courses choked.

To meet post-war competition these mines must be mechanized and cleaned up. And, it must be done without loss of production. This can be done most satisfactorily with the all-purpose Whaley "Automat" loading machine, getting maximum tonnage production at lowest cost on regular shifts, and using these same machines with skeleton crews on the off shifts for cleanup and development work.

In the Whaley "Automat", you have a loading machine that will handle any lump of coal that will pass through your tippie, or any size rock your cars, aerial tram or larry will take.

When asking for literature and full information on the Whaley "Automat", please mention your conditions. Myers-Whaley Co., Knoxville 6, Tennessee.

Wm. Neill & Son, Ltd., St. Helen's Junction, Lancashire, England are licensed for Manufacture and Sale in Great Britain and Europe.



★ MYERS-WHALEY

Mechanical Loaders Exclusively For Over 36 Years

60 TON PAYLOADS



...The Answer To Today's Crisis and Tomorrow's Costs!

The desperate fuel crisis makes bigger tonnage imperative. In strip mines, hauling 60-ton payloads with Walter Tractor Trucks provides a drastic increase in production—at lower cost per ton. This enormous load per unit, hauled at good speeds, makes each trip from pit to plant many times more productive than with smaller trucks. Fewer units deliver greater tonnage—saving in maintenance.

This advanced hauling performance is accomplished by the tremendous power and traction of the 300 h.p. motor and the exclusive Four-Point Positive Drive—found only in Walter Tractor Trucks. Three Automatic locking differentials proportion the power to each of the FOUR driving wheels according to its traction at any instant. Great tractive power is always available in any weather or running conditions.

There is no wheel spinning or bogging down on slippery surfaces, soft ground or steep grades.

Despite their huge hauling capacity, Walter Tractor Trucks are easily handled. Hydraulic steering gives fingertip control. Engine ahead of wheels scientifically distributes weight and shortens wheelbase to provide small turning radius and flexible maneuvering. Full details on these and other valuable features of Walter Tractor Trucks are contained in descriptive literature. Write for it today.

WALTER MOTOR TRACTOR COMPANY

1001-19 IRVING AVENUE, RIDGEWOOD 27, QUEENS, LONG ISLAND, N. Y.

WALTER TRACTOR TRUCKS



WIRED FOR

Safe Shooting

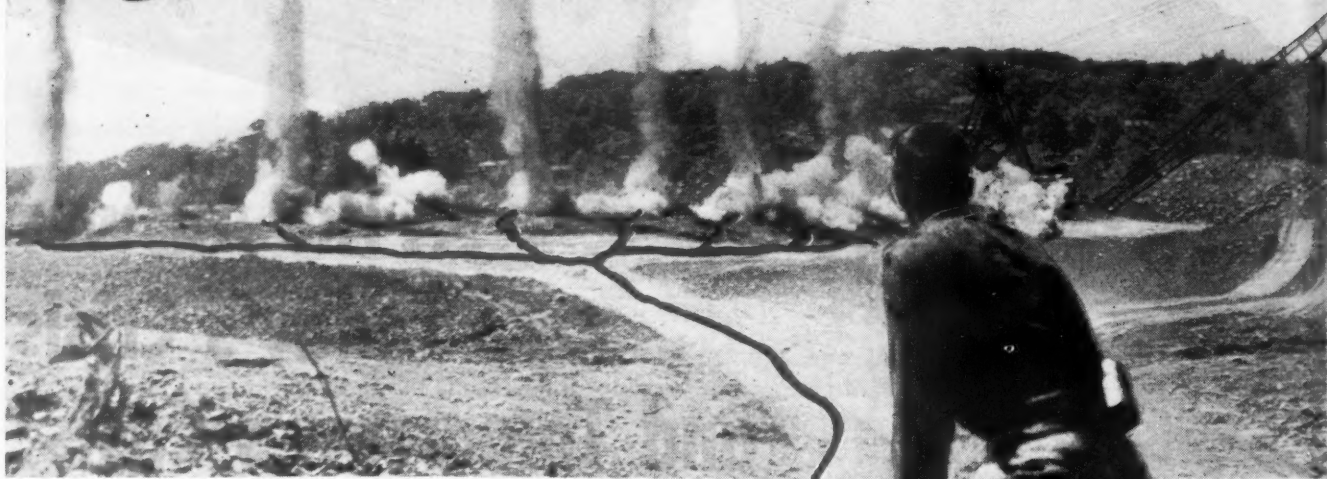
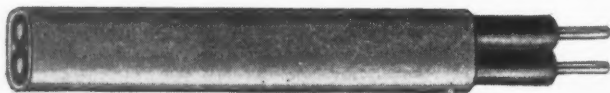


Photo Courtesy Carey, Baxter & Kennedy

**Down goes your plunger!
Up go the blasts!**

*D*epend upon Hazard Shot Firing Cords every time! Their flexible conductors, and insulation of durable synthetic rubber make them sure-fire. Their tough, smooth outer covering protects them against abrasion from rubble and long stretches of rocky ground. Sturdy construction and ease of splicing make these wires satisfactory throughout long service.



Hazard manufactures drag line cables, electric shovel cables and portable cords and cables of every type for surface and underground work, as well as heavy cables for every type of mining and construction work. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pennsylvania.

Shot firing cords are available in single or twin conductor cords with tough outer jackets. Hazard Type D is provided with the extra protection of a heavy, closely woven, weather-proof braid having a smooth, hard finish. Available in the desired sizes and with several strandings for different degrees of flexibility. The slight additional cost of Type D cord is more than repaid in the longer life it affords.

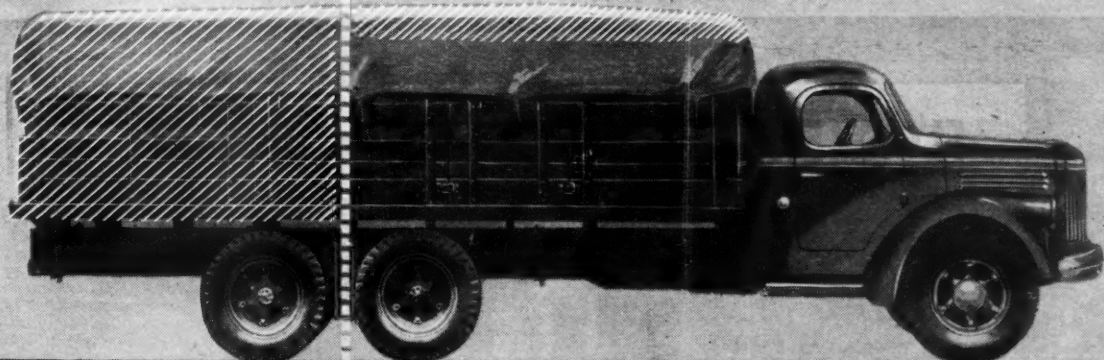


HAZARD



insulated wires and cables for every mining use

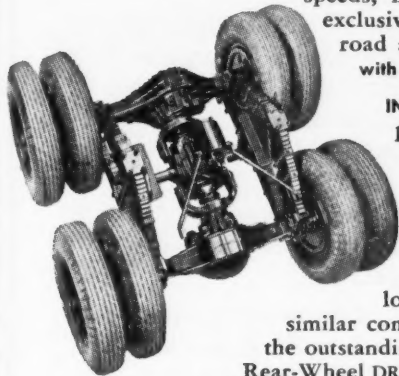
4145



HOW TO GET A BONUS OF 100% MORE PAYLOAD

A THORNTON Four-Rear-Wheel DRIVE installed on your new or used 1½-2 ton medium truck will double its payload capacity—give it the earning ability of two standard medium trucks, without the upkeep costs or extra driver's wages that two standard trucks require.

THIS RUGGED precision-built Thornton conversion wholly transforms your medium truck from the cab back . . . with new overlaying frame members engineered for 9 to 20 foot bodies; dual rear spring assemblies; two driving axles under the load—all providing the 100% bonus payload. In addition, the Thornton Drive incorporates a 2-speed gear case which doubles forward speeds, motor torque and rim-pull; gives you exclusive "walking beam" type springs that cut road and load shock in half; comes complete with 8 brand new tires.



IN TOTAL, a Thornton Drive gives you performance that no conventional truck can offer . . . ability to shoulder heavy loads through toughest off-the-highway areas . . . climb grades as steep as 50% . . . maneuver flexibly and speedily through traffic and on the highway. No matter what you haul—logs, lumber, coal, gravel, milk, or any similar commodity—it will pay you to investigate the outstanding advantages of the THORNTON Four-Rear-Wheel DRIVE. Send the coupon for full details—today!

PLUS

50% Gradability

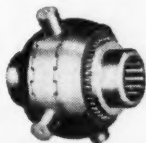
Thornton's 2-speed gear case doubles speed ranges, gives a 2.04:1 low ratio, permitting loads of 26,000 lbs. G. V. W. to be hauled up grades as steep as 50%.

PLUS

100% More Traction

Thornton's two driving axles and 2-speed gear case double a standard truck's normal tractive ability, motor torque and rim-pull.

The heart of the THORNTON DRIVE is the exclusive THORNTON Automatic Locking DIFFERENTIAL which gives both axles POSITIVE DRIVE and DIFFERENTIAL ACTION without "axle fight." Available as replacement in many standard trucks. Write for details.



The ODT, recognizing the importance of the THORNTON Four-Rear-Wheel DRIVE, allots 8 new tires, any size, with each Thornton unit. You get them for your truck when you have a THORNTON Four-Rear-Wheel DRIVE installed.



NO PRIORITY OR RATION RELEASE NECESSARY

EVERY
THORNTON 4-Rear-Wheel DRIVE
INCORPORATES A
THORNTON Locking DIFFERENTIAL
ALSO AVAILABLE FOR TRUCK AXLES

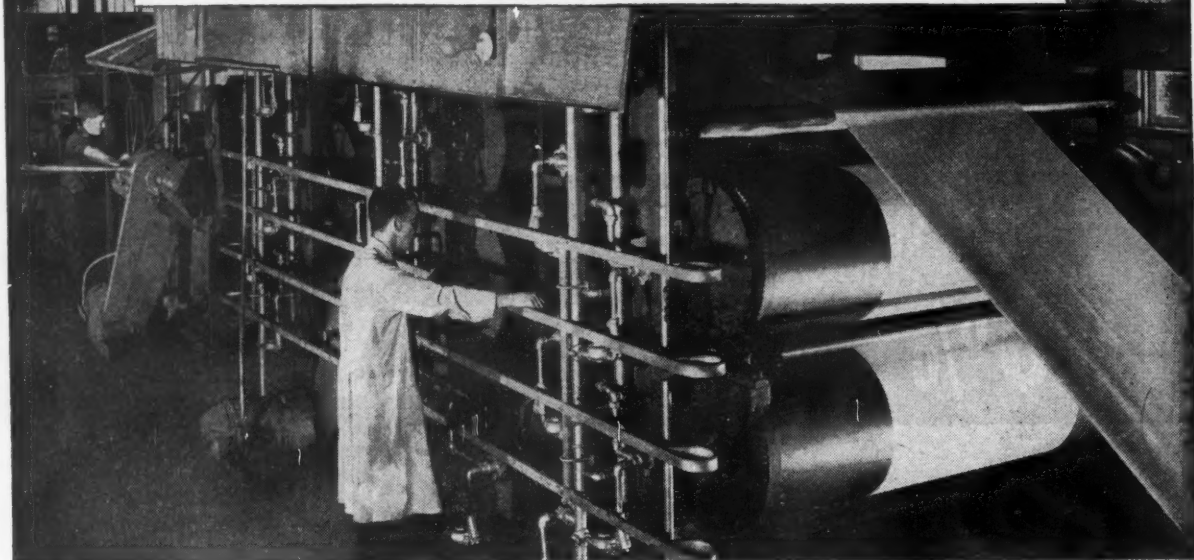
Thornton Tandem Co.

8701 Grinnell Avenue, Dept. 58, Detroit 13, Michigan, U. S. A.

Please send me catalog of facts on changing my 1½-2 ton truck into a heavy duty truck.

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Address _____
City _____ State _____
Make of Truck _____ Year _____
Used for _____

FLOCKER uses this exclusive process



... to give you *better brattice cloth*

Flocker Moropa Brattice Cloth offers greater resistance to fire and mildew ... stays clean longer and, under identical

conditions, outwears the ordinary product.

This all-around superiority is achieved through an exclusive chemical process applied to either Jute or Cotton. The fabric is first saturated with special chemicals, then "can-dried"—a process adapted from the textile field—which thoroughly impregnates and bakes fire and mildew resisting properties into every fiber of the material.

And yet, in spite of its superior qualities, Flocker Moropa Jute Brattice Cloth costs you no more than ordinary Brattice Cloth ... and prices are only slightly higher on Cotton. In reality, substantial savings can be realized on the use of either type.

If you're interested in the advantages this better Brattice Cloth affords, write for detailed information and quotations.

PROVED SUPERIORITY IN COTTON OR JUTE

SUPERIOR FIRE-RESISTANCE—Protection lasts almost indefinitely, since chemicals are so thoroughly impregnated that they do not readily leach out.

SUPERIOR MILDEW REPELLENCE—Chemicals used do not absorb excessive moisture and fabric remains relatively dry and repellent to mildew.

STAYS CLEAN—Does not collect mildew "whiskers"—hence no slimy dirt.

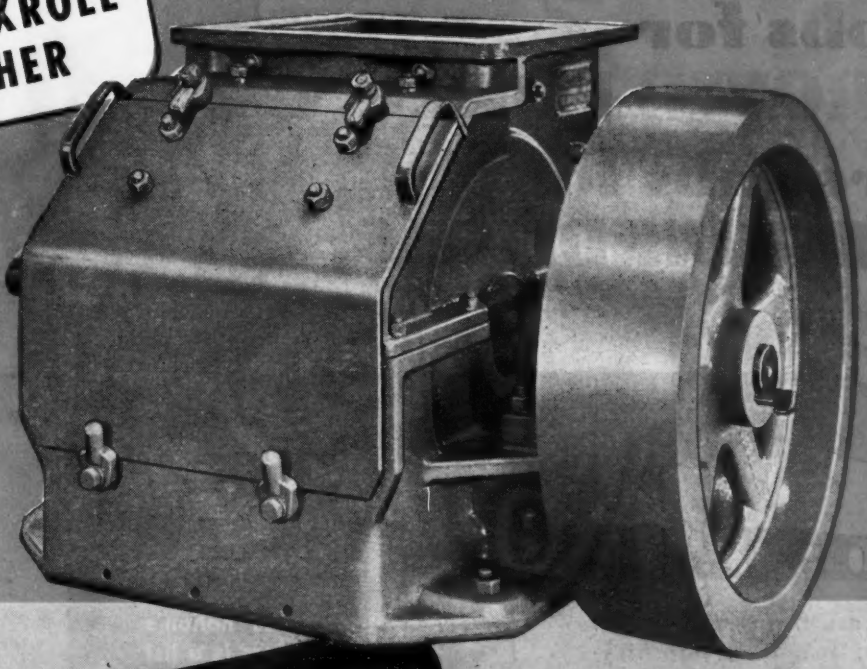
LONGER SERVICE—Can be used and re-used over and over again. Absence of slime eliminates objections to recovery—men will co-operate in maintaining this Brattice Cloth which so vastly improves their working conditions.

JOHN FLOCKER AND COMPANY

644 GRANT STREET, PITTSBURGH 30, PA.

Since 1822, Ropes, Slings, Nets and Cordage Fittings, Tackles, Waxed and Unwaxed Linen ... Specialists in Cordage Problems ... Wire Rope

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18" x 12" FLEXROLL
COAL CRUSHER



(Patented)

FOR CRUSHING LUMP TO
STOKER SIZES
IN ONE OPERATION



A new-type, small-capacity unit high in crushing efficiency but low in cost and maintenance. Control the top size of stoker coal by crushing oversize from screen with this low-priced crusher. Send for Bulletin No. 277.

THE JEFFREY

MANUFACTURING COMPANY

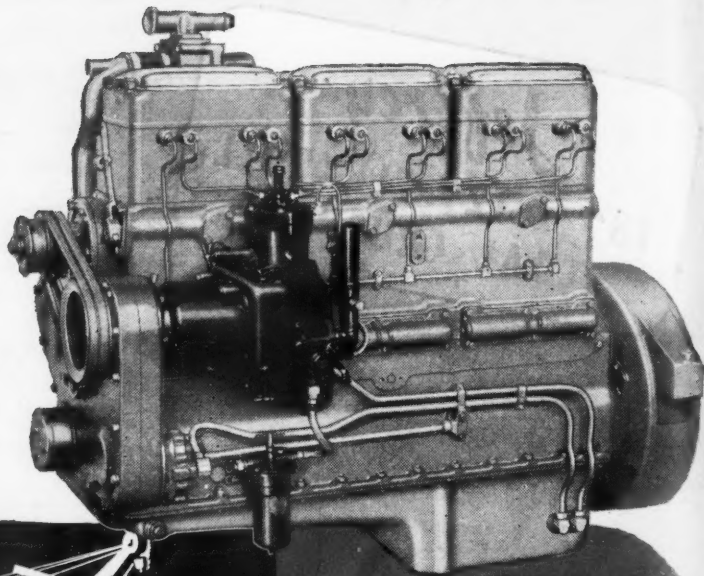
912-99 North Fourth St., Columbus 16, Ohio

ESTABLISHED
1877

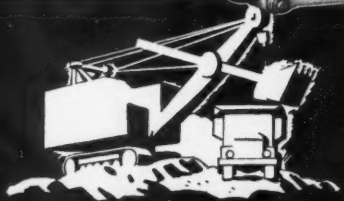


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|--------------|--------------|--------------|---------------|----------------|------------------|
| Baltimore 1 | Buffalo 2 | Cleveland 13 | Harlan | Milwaukee 11 | Pittsburgh 22 |
| Birmingham 3 | Chicago 1 | Denver 2 | Houston 5 | New York 7 | St. Louis 3 |
| Boston 16 | Cincinnati 2 | Detroit 13 | Huntington 19 | Philadelphia 3 | Salt Lake City 1 |
| | | | | Scranton 3 | |

Jobs for PROVED POWER are jobs for CUMMINS DIESELS



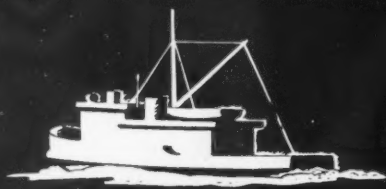
More than 90% of all the long-line, franchise-operated, heavy-duty, diesel-driven trucks now operating in the Western States are Cummins-powered.



Any list of the nation's major contractors is a list of Cummins Diesel owners. Their records prove that ... "powered by Cummins is powered for profit."



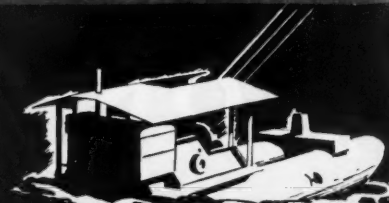
On the rich Mesabi Iron Range, more than 80% of the rubber-tired earth and ore moving equipment is powered by Cummins Dependable Diesels.



Service facilities at some 40 salt water and fresh water ports ... one more reason why so many commercial and pleasure craft are Cummins-powered.



In the vast Mid-Continent Area—the world's greatest oil producing region—Cummins Dependable Diesels power more drilling rigs than any other diesel.



In the Northwest Woods, no single make of diesel engine powers as many yarders, loaders and heavy-duty trucks as Cummins Dependable Diesels.



Some 130 leading builders of powered equipment now offer Cummins Diesels as standard or optional original power ... proof of proved performance!



SINCE 1918...PIONEER OF PROFITABLE POWER
THROUGH HIGH SPEED DIESELS

For every heavy-duty power application—automotive, portable, stationary and marine—a proved-on-the-job Cummins Dependable Diesel ... 50 to 275 hp.

CUMMINS ENGINE CO., INC.
Columbus, Indiana



Preformed wire rope

**Betters Service
3 ways...**

RAILROADS own and operate thousands of pieces of heavy-duty equipment for which Preformed wire rope provides the muscle. Thus, Preformed is found on power shovels, cranes, derricks, hoists, winches—on car pullers, car retarders, dumpers—on loaders, unloaders, slings.

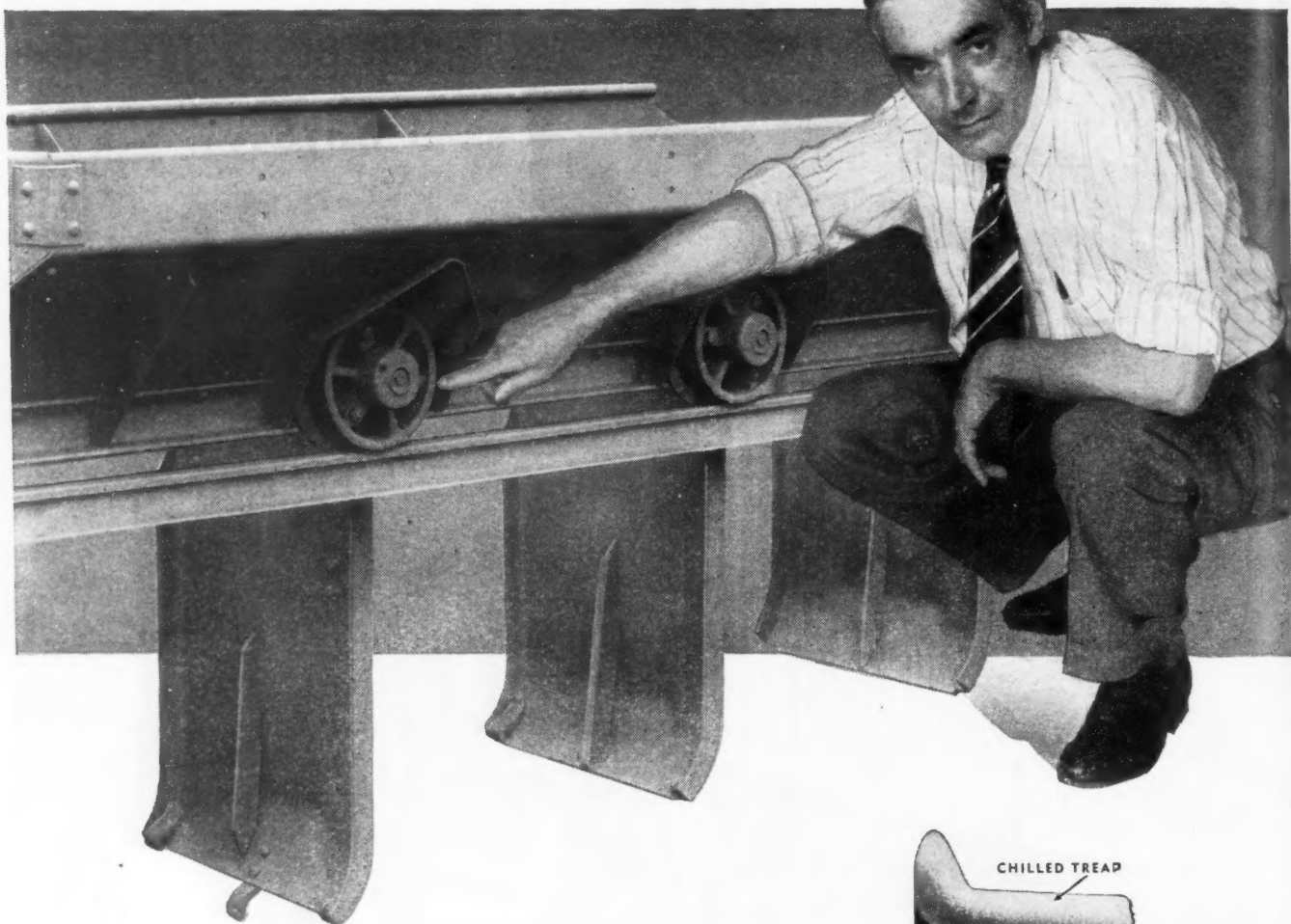
Railroads—like other industries—choose Preformed because it is *economical*, *safe*, and *saves wear* on equipment.

Its *economy* comes from longer life, due chiefly to lack of internal stress. It is *safer* for workmen because its wires lie flat when cut or broken, and because preforming relaxes wire rope and makes it flexible... It *saves wear* on expensive equipment because it reduces rotation on sheaves and spools evenly on drums.

Executives in *all* industries recognize the better service offered by Preformed.

ASK YOUR OWN SUPPLIER FOR PREFORMED WIRE ROPE

You may have a Production Bottleneck **HERE!**

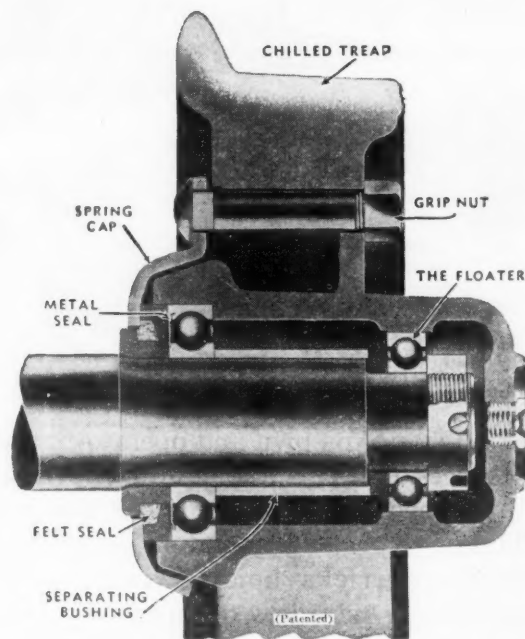


★ During these days hundreds of little leaks, little bottlenecks on the production front, have been uncovered. Finding them and eliminating them, in many cases, has resulted in tremendous savings in time, material, money and manpower. Let's consider one of these leaks in mining.

In many mines, wheels and trucks have been an orphan child, so to speak. And, with so little attention given to their vital importance, they have become little bottlenecks to production—retarding output, wasting grease, labor and power.

If you are not using S-D "Floater" Ball Bearing Wheels, you may, unknowingly, have a production bottleneck. For, engineers' tests have proved that your locomotives can handle almost 50 per cent more load when the cars are equipped with S-D "Floaters" than when equipped with wheels having other types of precision bearings. Furthermore, your own cost of greasing will be held to that of one greasing in 5 years, and wheel castings and bearings are guaranteed for 5 years against breakage, excessive wear or failure.

Don't wait any longer to check your wheels. They may be costing you plenty.

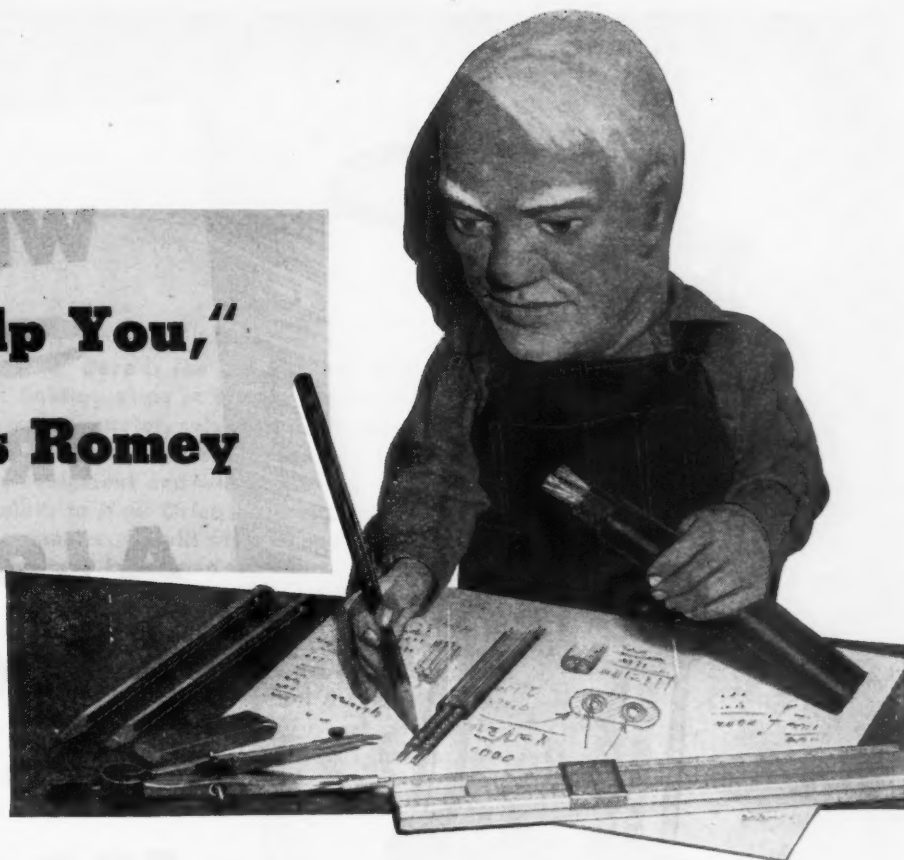


You can test S-D "Floaters" for yourself on our FREE TRIAL PLAN. Write to us now.

Sanford-Day Iron Works

KNOXVILLE, TENNESSEE

**"Let me help You,"
says Romey**



Romey is a good man to know. He's the accumulated knowledge and skill of the men and women who make Rome Cable Products.

Throughout the period of the war Romey has been constantly at work developing new insulating compounds and new products, and improving methods of making them.

This wartime experience enables him to handle your wire and cable needs even better than he's served you in the past.

Through his sales representatives . . . or direct to Rome Cable headquarters, he'll be glad to learn about your wire and cable problems, and he'll do his best to help you as he's helped so many others in various fields of the electrical industry.

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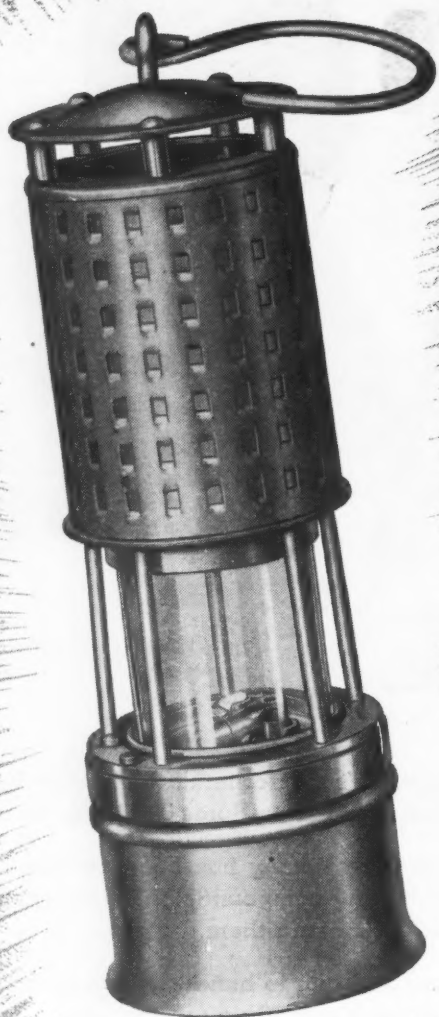
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Safely
TRAVELED
A LONG WAY
TOGETHER
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FLAME SAFETY LAMP

The Koehler Flame Safety Lamp is fully approved by the United States Bureau of Mines — it has a perfect rating. Write today for new folder "Use and Misuse of Flame Safety Lamp."

EFFICIENT • POSITIVE LOCKING DEVICE •
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WHEN YOU USE KOEHLER YOU USE THE SAFEST

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ALSO MANUFACTURERS OF THE WHEAT APPROVED ELECTRIC CAP LAMP

OUR PART IN A VICTORY SHIP ...

Here is the LST-512, one of the millions of tons of fighting ships in history's greatest battle fleet. This invasion carrier, salvaged after being crippled in action off Normandy, has BWH hose and other products among its equipment and will cruise mid-west waterways from Duluth to New Orleans during the months from June to September. It will stop at many different cities along the Great Lakes and the Ohio and Mississippi Rivers for public demonstrations of amphibious warfare.

In March of 1944 she joined a convoy bound for England and since that time has crossed the Atlantic twice, crossed the English Channel a score of times, and was beached on the Normandy coast on D-Day and was in the midst of heavy bombing and shelling—though never struck—landing a large number of American, British and Canadian troops in France.

We are proud to have had a part in helping to equip this and other ships that have enabled American assault troops to overcome our German enemies and to punch their way to the very threshold of Japan's homeland.

BUY WAR BONDS



OFFICIAL U. S.
NAVY PHOTOGRAPH

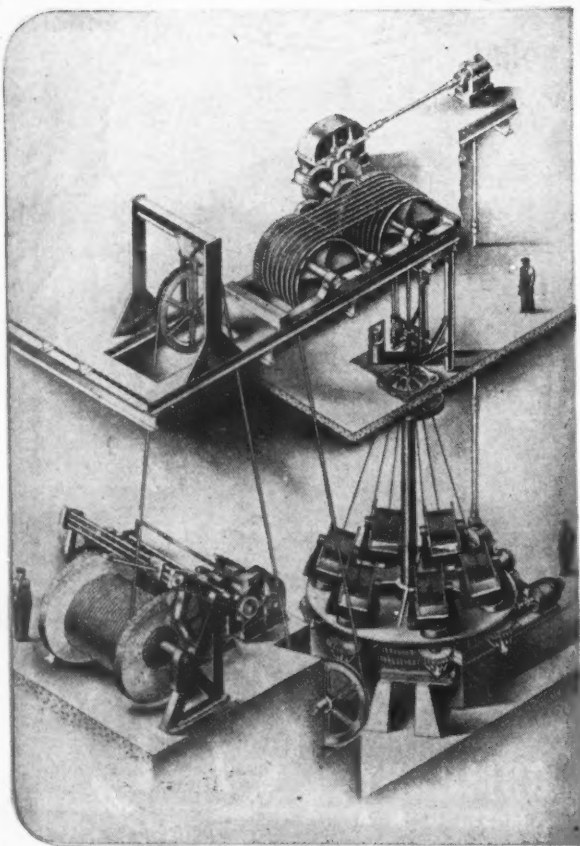
BOSTON WOVEN HOSE & RUBBER COMPANY

Works: CAMBRIDGE, MASS. Postal Address: Box 1071, BOSTON 3, MASS., U. S. A.



WHICH

WILL BUILD ROADS • • • S



New War-Borne Techniques Will Make America's Competitive System of Private Enterprise More Efficient Than Ever Before!

Although geared largely to war production, the Union Wire Rope organization is prepared to shift overnight to fill home-front requirements in wartime tempo. For instance, at the left is shown a giant wire rope closing machine developed by Union Wire Rope engineers in the war emergency. It is three stories high, has a range of $\frac{3}{8}$ inch to 4 inch wire rope and a maximum capacity of 27 tons of wire rope in one continuous length. Union engineers have devised many other new facilities and techniques with which to serve private enterprise more efficiently than ever before. Our war work has been such that our craftsmen will not have to relearn their skills.



union Wire Rope

UNION WIRE ROPE CORPORATION

2130 Manchester Avenue Kansas City 3, Missouri

Tulsa 3 Houston 11 Chicago 6 Salt Lake City 13 New Orleans 16
Monahans, Tex. Portland 10, Ore. Ashland, Ky. Atlanta 1

STREETS • AIRPORTS • FLOOD CONTROLS

keys to new frontiers?

UNITED STATES OF ALERTNESS!

Let's pull together

FOR THIS KIND OF AN AMERICA

Americans have called upon their national leaders for a far-reaching highway system, a network of airports, and a long-studied program of flood control and land conservation. Why? Because they are the keys that will open new frontiers and because they are among the few proper and fertile fields for the investment of public funds.

Our leaders in Congress have responded by approving our largest highway and flood control programs and doubtless will respond with an airport program.

But, the approved programs are not being pushed to finalization in many states. The National Highway Program, for example, is based upon state responsibility for plans by State Highway officials and funds by State Legislatures. No citizen can afford to let this sound program go by default. If there is a lag in your theatre of operations, make it your concern. Send the coupon for "The Road Ahead", published by the American Road Builders' Association, and "Put Your Town on the Air Map", published by the Personal Aircraft Council of the Aeronautical Chamber of Commerce of America.

UNION WIRE ROPE CORPORATION, 2130 Manchester Ave., Kansas City 3, Mo.

- ☐ Send a Free copy of book entitled "The Road Ahead"
- ☐ Send a Free copy of book entitled "Put Your Town on the Air Map"

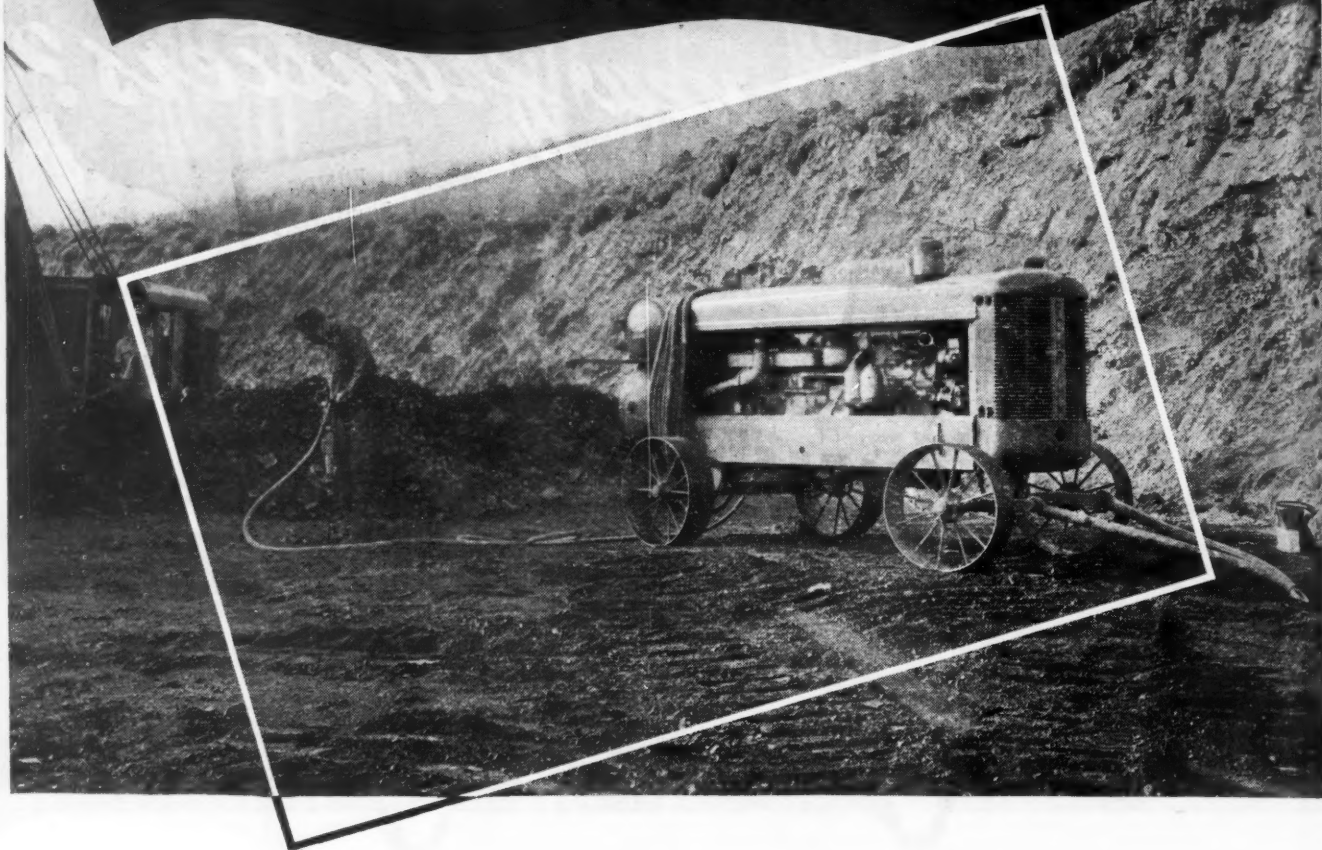
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Firm

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D-45

**ANOTHER COMPRESSED AIR JOB DONE BY
THE VERSATILE SCHRAMM!**



HERE is another mining job calling for a Schramm Air Compressor . . . one of many uses for Schramm in the mining industry!

Schramm Compressors—often called the “versatile” Compressors because they do so many jobs around the mine—simplify your demands for air where you want it.

Yes, 24 hours-a-day you can work your Schramm. Aiding in giving you uninterrupted service are such features as 100% water cooling . . . mechanical intake valve operating from cam in perfect timing . . . larger discharge valve with lower lift adding to efficiency.

There's push-button to allow instant, easy starting, and every Compressor is compact, lightweight, easy to move about on the job. For your many, many jobs requiring compressed air, turn to Schramm. For further details on their construction, operating capacity, etc., write today for a copy of our new booklet just published.



SCHRAMM INC.

**THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA**



GOOD MEN are glad to see Rochester ropes on the job
... because the best wire rope is assurance of
uninterrupted work, and insurance against accident.

GOOD MANAGEMENT will see that they get Rochester
... which is over-specification in every grade and size, with
built-in extra strength for longer service, lower costs.

GOOD NEWS ... is that with government priorities
lifted Rochester ropes, of all types and sizes, are again
available for prompt shipment.

ROCHESTER *Ropes*

JAMAICA, NEW YORK • CULPEPER, VIRGINIA



*Culpeper, Va., and
Jamaica, N. Y., plants*



Winning Combination

JOY LOADERS and SHUTTLE CARS

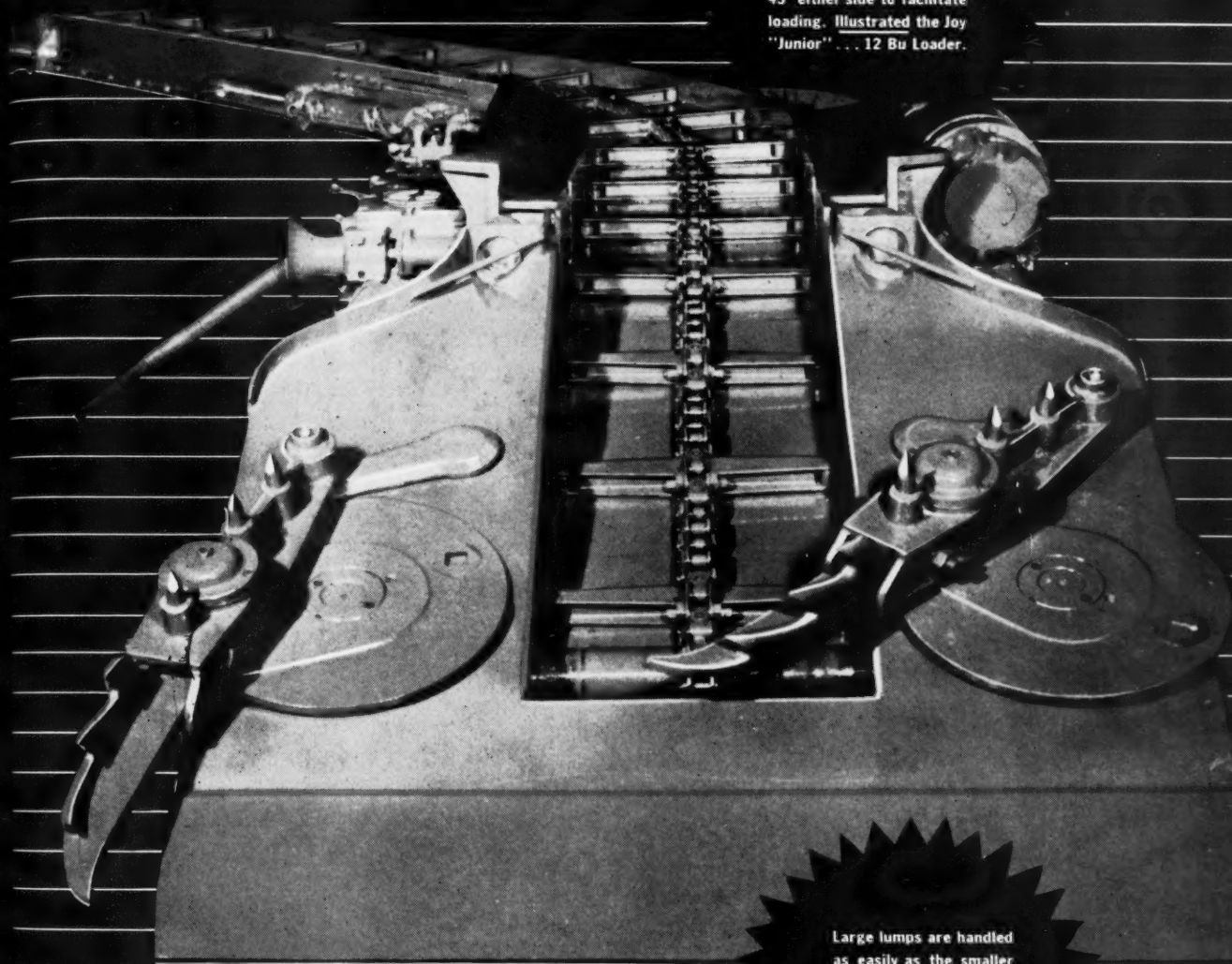


**Working on a properly timed schedule,
the Joy Shuttle Car and Loader Team
has proved its superiority over older methods in
many mines by producing more tonnage . . . faster
and at lower cost per ton.**

That's a rather strong statement to make, we realize . . .
but it's not a bit of an overstatement! For case records can
show instance after instance where a Joy Engineer has
helped to coordinate production activities, and through
use of this winning combination has pulled up production
from a slump to a tonnage-breaking hump.

A Joy Engineer is at your service . . . he may be of valuable
assistance. There is no obligation.

All Joy Chain Conveyor Loaders are equipped with a self-articulating loading boom which may be swung 45° either side to facilitate loading. Illustrated the Joy "Junior" . . . 12 Bu Loader.

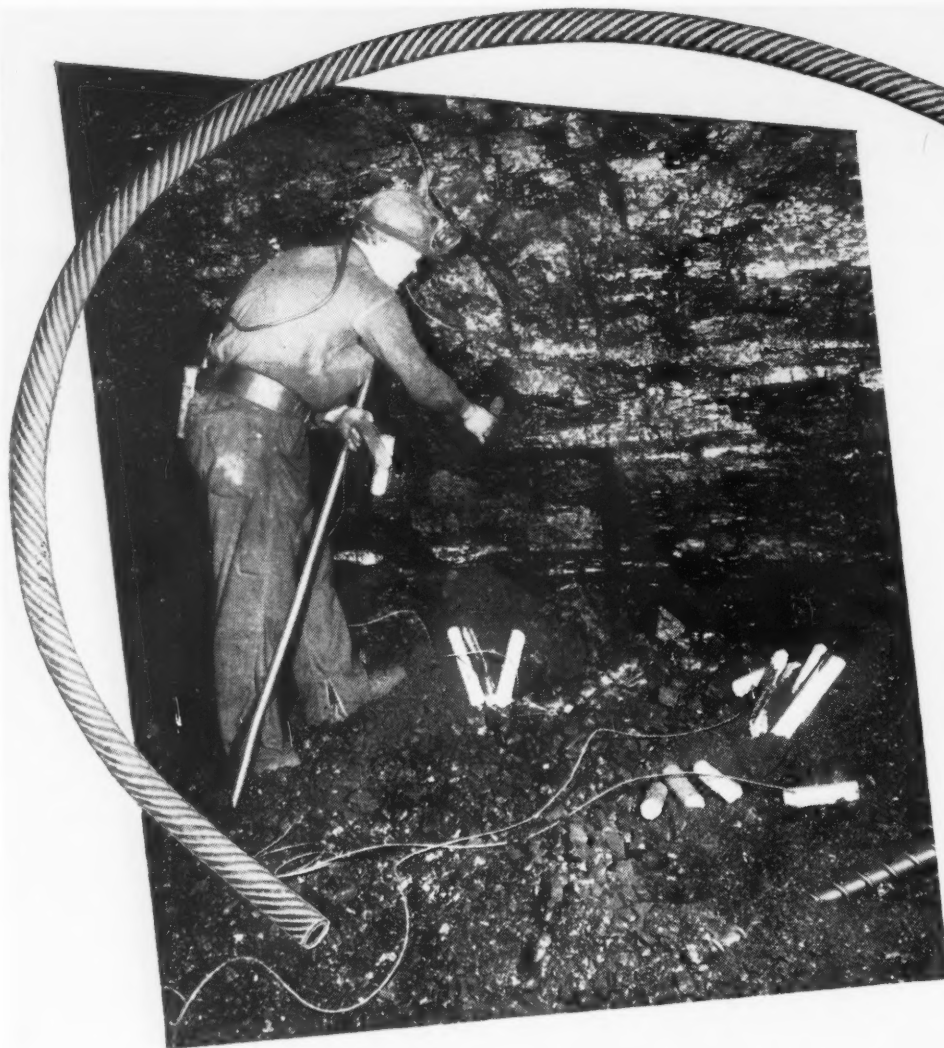


Large lumps are handled as easily as the smaller ones, as evidenced by the illustration to the left. This particular loader model is a Joy 11 Bu . . . rated capacity, 5 tons per minute.



*Consult
a
Joy Engineer*

JOY



Keep the USE as Safe as the FUSE

Experienced miners recognize in Ensign-Bickford Safety Fuse the ultimate product of the fuse-maker's art. From its very start in this country in 1836 right down to the present day, genuine Safety Fuse has led the way with every advance in materials, methods and results.

Six simple steps define the proper use of this reliable product.

Square and clean is the way to cut it. Use a sharp knife or bench cutter.

Always seat the fuse snugly in the cap to avoid misfires.

Firm crimping is needed to hold the cap and fuse together securely.

Exactly in the center of the primer cartridge is the safest place for the cap.

Tying is vital if the fuse and cap are not to slip out of place.

You won't have to run if you don't short-fuse — give yourself time!

Put them all together and they spell SAFETY — the goal of every thinking miner.

THE ENSIGN-BICKFORD COMPANY • Simsbury, Connecticut



**Since 1836
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Coal Age

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

Ivan A. Given, Editor

SEPTEMBER, 1945

Atoms for Coal?

WHAT'S AHEAD in the field of atomic power? Will it, to get a little more specific, put coal out of business soon—say in ten years or so? Will it ever put coal out of business? There is, as yet, no answer to the last, although those engaged in studying utilization of atomic energy feel that further research and development of processes and techniques will widen the field of application and might eventually make it the leading source of light, heat and power.

The immediate prospect, however, apparently is one of little or no competition with coal and other fuels. As brought out in the special section elsewhere in this issue, cost is one big bar to wide power use in the near future. For the next ten years or so—and perhaps considerably longer—atomic power is looked upon as a supplement to coal and other fuels where its other qualifications offset cost and utilization difficulties. Sunday supplements to the contrary, coal need have no fear that its position as the No. 1 source of energy will be seriously challenged for some time.

Will It Work?

SOME OF the answer to what nationalization of an industry might mean already is beginning to appear in Great Britain. In a nutshell, the miners are expected to turn to. The word comes not only from Emanuel Shinwell, the new Minister of Fuel and Power, but also from such men as the Communist leader of the South Wales district of the National Union of Mineworkers. "The return of this government means not living in ease but work—organized fairly and scientifically," is the way the latter puts it. The *Iron and Coal Trades Review* is unable to resist pointing out "that if production had been governed by such motives in the past three years there would have been no serious coal problem today, for they would have insured that active and wholehearted cooperation between capital and labor without which progress in industry is impossible."

Efficiency of course is the crux of the problem. In Great Britain, nationalization advocates charged management with the sole responsibility for the steady war-time decline accompanied by growing absenteeism, refusal to work with management and disregard of the fundamentals of progress. Now that nationalization is imminent, it appears that policy tolerated and even

encouraged under private management turns out to be ill considered if not reprehensible. Whether a political management can make it stick and take the other steps necessary to increase efficiency remains to be seen, but if it cannot it is difficult to see how Great Britain can avoid a further recession in coal mining.

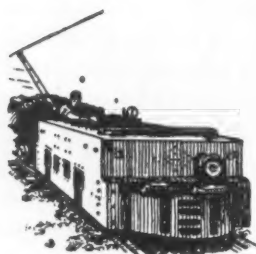
The British nationalization experiment will be watched with interest here and elsewhere as an indication whether a nation with a representative government can go to state operation without loss of freedom for the citizen. In the United States, with government disposed to keep hands off, the coal industry's evident determination to raise efficiency and pay better wages, render better service and work for a better understanding between employer and employee had a chance to yield results—and did. Intensification of the work will further prove coal's right to continue as a free enterprise serving the public even more efficiently than in the past.

Time to Change

"ECONOMIC FUMBLING" is a phrase appearing more frequently in the declarations of certain government agencies, particularly OPA. If one accepts its designation of industry as kettle, then OPA, on its record, can hardly avoid nomination as pot. The war effort admittedly required an organization to prevent price dislocations, conduct rationing and handle similar chores but there is little evidence that such an organization was expected to enter into "economic fumbling" and especially industry baiting, such as that involved in the suits recently filed against the Pittsburgh Coal Co. and certain other producers.

The Pittsburgh Coal and other actions smack loudly of what is known in bureaucratic circles as "making a record." More important, there is real reason to accept company contentions that OPA itself does not know what its orders mean and wants the courts to settle the matter. Anyone who has had to wade through much of the "gobbledygook" put out by OPA and other agencies on its same general order finds it easy to concur in that conclusion. Looking at OPA's actions, rather than its words, there is good reason for believing that it is hanging on to life and meanwhile is doing its best to put the squeeze on industry by keeping down prices while other agencies raise wages and other costs. It is time for a stand and the producers who have declared their intention of fighting deserve congratulations and support.

Planning for In



What problems does peace bring to coal mining and—more important—what opportunities? How can coal improve its position as the No. 1 source of energy now and in the days to come? To help answer these questions and facilitate planning for the future, Coal Age draws on the opinion of industry leaders and its own analysis of trends to outline problems and opportunities and develop a charter for progress.

What Coal Executives See Ahead

THE END of World War II finds the coal industry generally confident of the future. More important, it is aware of its problems and has definite plans for solving them. Both these facts are highlighted in replies to a telegraphic inquiry by Coal Age asking a group of coal-mine presidents their opinion of the future prospects for coal mining, its major problems and what action should be taken to solve them.

Business should be good is the general conclusion of this group of executives, with list, among other things, increased efficiency, low cost, quality, better merchandising, intensified research, better labor relations, better public relations, better working conditions and a stable price structure as means of capitalizing on the industry's opportunities. Individual comments are reproduced below and are followed by an analysis of the outlook and of plans for progress contributed by Coal Age.

In reply to your request for my opinion of the future of the coal

industry I assume you mean the long-range prospects, as it seems reasonable to expect that after a comparatively short period of time for readjustment to civilian production domestic consumption plus Europe's needs for coal from America pending the rehabilitation of her mines and transportation facilities should keep coal production at somewhere near 80 percent of the wartime demand for three to five years.

As to the long-range prospects it is my opinion that the industry faces the severest test of its history to maintain its existence as a healthy functioning part of our economy. The handicaps that beset it—principally from an all-time high wage rate—make its competitive position with energies which have, by comparison, been only slightly affected, one which requires the conscientious realization of labor for necessary wage-rate reductions and the ultimate that management can achieve in mechanization. Labor will not be easily educated to the need of sacrificing high wage rates in the interest of maintaining

the competitive position of the industry and further progress in the application of mechanical devices is limited by natural obstacles. Hence it appears likely that coal production within another decade will fall below the level of pre-war years unless new uses for it emerge which this observer does not presently visualize.—**A. R. LONG, Brookside-Pratt Mining Co., Birmingham, Ala.**

First, recognition by owner operator that mechanical mining is here to stay and that anyone having old mines that cannot be modernized might better quickly abandon them. Second, that the union and high wages are here to stay also and that labor relations must be improved and capital and labor enter into sincere discussions of their individual problems in order that they may enter into mutual understanding and agreement to keep away from strike threats or lockouts. I believe this can be negotiated satisfactorily. Third, research to widen the use for coal, including thought of installing byprod-

Progress Coal Mining

uct plants at coal mines strategically located. Last, I believe good coal properly prepared from mines modernly equipped has no major problem if proper supervision is given with efforts on the part of individual operations to eliminate waste and mismanagement.—H. K. COOK, *The Diamond Coal Mining Co., Knoxville, Tenn.*

Because of low inventories, lake, export and retail demands, we expect market to absorb production until April with no recession of prices in our District 8, with exception of badly off grades now marketed, then a postwar slump of six months followed by several years of good times. Our problems are unsettled labor, deteriorated equipment, very high cost and inability to obtain equipment promptly but this may be relieved by release of critical raw material and a revision of labor laws without too much unemployment pay.—GUY DARST, *Benedict Coal Corp., Knoxville, Tenn.*

Near-term prospects: next six months bright. Future prospects will depend on success of research in developing the immense potential values of coal. New uses and better use of coal will result from research and more research. Coal will be more costly than ever before. Research must make it more valuable than ever before. Incidentally, the fantastic social and political schemes to develop hydro power at public expense and in competition with job-producing industries such as coal mining should be curbed.—J. E. BUTLER, *Stearns Coal & Lumber Co., Stearns, Ky.*

The major postwar coal problem probably will be the prevention of ruinous competition caused by sudden

and violent changes in demand. This will require the adoption of price stabilization measures. To avoid falling behind the progress made in the use of other forms of energy, the coal industry should give generous and continued support to research activities. New business is created through research and invention, not price cutting.—R. D. STOCKDALE, *Red Jacket Coal Sales Co., Columbus, Ohio.*

Believe shortage of stocks will cause continued demands until next spring. It will be increasingly difficult to induce young men to enter mines except to operate machines, hence future mining is a loading-machine proposition. Believe coal industry needs a new coal act to regulate competition and place a floor under prices.—W. P. TAMS JR., *Gulf Smokeless Coal Co., Tams, W. Va.*

First problem, competition of oil and gas. Coal must stand on its own feet and produce cheaper power than

oil or gas. Talking about traffic it gives the railroads will not defeat diesel. Diesel must be beaten by new-style equipment such as new C. & O. engine. Cost of coal must be brought down and only solution to this is much increased mechanization.—FRANK L. HORNICKEL, *Anchor Coal Co., Cleveland, Ohio.*

Major problems:

1. High labor cost compared to competitive fuels.
2. Labor difficulties.
3. High transportation cost.
4. Home owners' antipathy to its use.
5. Industrial antipathy to its use.
6. Railroads—inroads of diesels, etc.

Proposed action to solve above problems:

1. Labor cost—Lower labor cost by fair but not exorbitant wages and further intelligent mechanization of mines.
2. Labor difficulties—Further and better management-labor understanding made possible by more tolerant and fair union attitude in which government should help as well as operators.
3. Transportation—Freight readjustments, intelligent and economical use of inland transport; also intensive research to determine new and better ways of transportation.
4. Home owners—Intensive research in new home burning equipment to make it cheap, economical, clean, smokeless, effortless and automatic; also build reputation for dependability of supply and improve retail outlet system to make it generally more modern and efficient in function and service.
5. Industrial—More economical, smokeless and automatic equipment; dependable supply up to specifications.

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6. Railroads—Intensive research with railroads on development of really efficient and smokeless coal-burning locomotives; cooperation with railroads in public relations and general selling job.

7. Price structure—A government-regulated minimum-price set-up to eliminate ruthless and ruinous cut-throat price wars and stabilize industry for its own and the national good.—**ROLAND C. LUTHER**, Peerless Coal & Coke Co., Vivian, W. Va.



The immediate future of coal should be good. The long-range future also seems promising. In between, there may be difficulties of kinds not foreseeable entirely at this time. The

major problem of the industry is to secure a realization on the part of the labor interests that they must cooperate in reducing costs and giving good service to the customer. Only by such cooperation in the postwar period can the industry hope to prosper and provide jobs and working time on a satisfactory scale.—**J. B. WARRINER**, Lehigh Navigation Coal Co., Philadelphia.

I feel that the demand for fuel in this country will be heavy for an indefinitely long time. As coal has always been the major source of fuel supply it would seem to follow that the demand for coal would be strong for a long time. I think this would be the case unless the natural market outlets for coal are disturbed by government-financed and subsidized pipelines and ships, built for the purpose of meeting the oil needs in the war effort, being allowed to dump cheap oil and gas into the fuel markets. If the statisticians' figures are correct, this oil and gas would not last for many years but it probably would last long enough to bankrupt and close down many mines in many producing areas.

I feel that coal-mining methods have made great strides in the past three or four years and now with the opportunity to obtain improved equipment and to apply new methods mining should reap the benefits of these new developments.

The major problems for the industry are the ability of management and labor to adjust their mutual problems on an intelligent and fair basis and for the industry itself to develop a system of marketing its product that is stable,

intelligent and has a background where orderly system displaces the ruinous, cutthroat competition of the past.—**L. EBERSOLE GAINES**, The New River Co., Mt. Hope, W. Va.

In the domestic heating field, anthracite will be confronted in the postwar period with more severe competition than ever and to meet this we must offer the householder complete automatic heating service, including burning equipment, removal of ashes from the premises and complete servicing of equipment. This must be at a price competitive with other fuels. Secondly but of equal importance if we are to maintain the present high wage scale we must get greater efficiency from our workers and greater production per man.—**BRUCE PAYNE**, Payne Coal Co., Wilkes-Barre, Pa.



The problem ahead of us is comparatively simple. However, the carrying out requires a great deal of thought and effort. I believe the problem can best be stated as follows:

1. Improved mining methods.
2. Research.
3. Public relations.
4. Upgrading of product.

Solution of the problem requires that the coal industry hire the best brains money can buy.—**JAMES PRENDERGAST**, Susquehanna Collieries Co., Cleveland, Ohio.



Your request large order. Would require publication about as long as "Gone With the Wind," which is a good title for some anthracite business if we do as at present. The pub-

lic won't be bothered and that means modern automatic equipment, ash removal, temperature control, inexpensive installation and low and easy maintenance cost. It all begins with research and ends with the coal dealer and necessitates the cooperation of labor in the reduction of costs through machine mining and higher production per man per day. I could go on for hours but this is about enough.—**JOHN C. HADDOCK**, Haddock Mining Co., Wilkes-Barre, Pa.

The major problem, as I see it, is the demand. Of the production in 1944, my understanding is that approximately 100,000,000 tons came from strip operations where production per man is five or six times greater than deep mines in this district. This being the case, it is natural to assume that strip operating costs should be considerably less than those of deep mines. While the present indications are that the demand will continue to be great, it is my belief that the financial future of the deep-mining companies will be seriously jeopardized should the price structure weaken. Ceiling prices set during the war permitted an average of 15c. per ton or 1942 profits, whichever was greater. To protect both miner and operator, a suggestion that the present ceiling be set as the minimum price might be constructive.—**J. C. FORREST JR.**, Castle Shannon Coal Co., Pittsburgh, Pa.

Next five years, good. Major problems are:

1. Elimination of strike threat by better employee relations and higher wages justified by increased efficiency.
2. Recruiting young men through greater opportunities, better public relations and closer cooperation with schools and colleges.
3. Improvement of automatic coal-burning equipment and smoke elimination through research, such as Battelle, and consumer education.—**WHITNEY WARNER JR.**, The Warner Collieries Co., Cleveland.

The future of coal mining in the postwar period depends largely on a more cooperative and broad-minded policy between management and labor and the further application of more efficient production and preparation facilities and methods, together with an educational sales policy more effective than that of competitive fuel.—**F. R. PHILLIPPI**, Dye Coal Co., Cadiz, Ohio.

In my opinion, when strong demand for coal is over operators will find themselves possessed of many high-cost operations due to worn-out equipment and lack of adequate development work. These mines had a place in our economy during the war but I believe that careful thought should be given by all operators to the wisdom of closing such mines. The only way to lower costs in an inherently high-cost property is to get volume tonnage. This leads to price cutting and the vicious downward spiral. Quality coal produced

Seven War Years in Coal Mining

1939

May 13—"Exclusive-bargaining" right won by miners in new Appalachian agreement signed after federal intervention halting stoppage that began April 1.

May 27—New anthracite agreement signed without stoppage; old pact was extended from April 30.

Sept. 1—Germany attacks Poland.

Sept. 3—France and Great Britain declare war.

1940

Jan. 23—"Voluntary" anthracite production-control and allocation plan approved by State governor, effective week ended Feb. 3; confirmed by legislation signed July 7, 1941.

May 20—Supreme Court holds Bituminous Coal Act of 1937 constitutional.

Sept. 16—Selective Service Act signed; registration Oct. 16.

Oct. 1—Bituminous minimum prices become effective.

1941

April 4—Bituminous Coal Act continued two years from April 26.

March 10—Lend-Lease Act signed.

April 28—Southern operators give in to end stoppage over Appalachian contract; wages raised \$1 per day; southern operators bow to National Defense Mediation Board and sacrifice 40c. differential June 9, signing contract July 6.

May 19—Anthracite agreement reached after 1-day stoppage; wages increased 10 percent.

May 27—State of unlimited emergency.

June 30—Coal mining given priority status.

Sept. 15—"Captive-mine" strike begins; after several stoppages, special commission awards union exclusive bargaining right Dec. 7 after Lewis breaks National Defense Mediation Board.

Nov. 5—Secretary Ickes named "Solid Fuels Coordinator for Defense"; "Solid Fuels Coordinator for War" May 25, 1942.

Dec. 7—Pearl Harbor.

1942

Jan. 8—Stockpiling campaign starts.

Jan. 12—National War Labor Board succeeds NDMB.

Feb. 15—Use of natural and mixed gas restricted in 17 northeastern states.

March 14—Fuel-oil delivery regulations adopted in 17 East coast states; campaign to convert to coal started.

April 1—MPR 112, fixing anthracite ceilings, effective.

April 13—Top preference ratings granted mining machinery.

May 6—Occupational deferment of critical workers in coal and railroad industries permitted.

May 16—Deliveries of light fuel oil cut 50 percent in East; oil for coal spraying banned.

May 18—MPR 120, fixing bituminous price ceilings, becomes effective along with MPR 121 (miscellaneous solid fuels) and

MPR 122, wholesale and retail solid fuels prices.

June 16—Orders placed for pipe for "Big Inch" line; extension to Atlantic Coast announced Oct. 28.

June 17—NLRB declares foremen's groups to be appropriate bargaining units and orders election July 17 at mines of the Union Colliery Co.; decision reaffirmed Sept. 19.

Sept. 1—Natural-gas deliveries restricted; restrictions on manufactured, natural and mixed gas made nationwide Nov. 13.

Sept. 29—Ickes asks longer work week—a request made some time previously by a number of operators.

Sept. 30—Manufacture and assembly of small stokers ended.

Oct. 27—Appalachian operators hold first meeting on lengthening work week; already authorized in Far West; captive operators complete arrangements Nov. 18.

Dec. 10—Anthracite agreement on longer work week completed; first meeting held Oct. 28.

1943

Jan. 24—Anthracite requested to suspend shipments to Canada and west of Erie, Pa.

Jan. 28—Construction of "Little Inch" line authorized.

Jan. 30—Oil and gasoline further restricted.

Feb. 14—Most bituminous districts signed up for longer work week.

April 19—"Solid Fuels Administration for War" established.

April 30—WPB limits receipts of bituminous coal and anthracite (May 1).

May 1—Seizure of anthracite and bituminous mines by government after failure to agree on new contracts brings complete work stoppage in both industries.

May 4—SFA issues Reg. 1, the first of a series of regulations, orders and directives restricting and controlling coal distribution to the present time.

July 20—After abortive attempt by central Pennsylvania, Illinois operators sign portal-to-portal contract; WLB rejects it Aug. 13.

July 31—Jewell Ridge Coal Corp. files portal-to-portal suit.

Aug. 16—WLB authorizes 8-hour day and 48-hour week; coal immediately moves to put it into effect.

Aug. 23—Bituminous Coal Act allowed to expire after two extensions from April 26.

Sept. 21—Texas-West Virginia gas line authorized by FPC.

Oct. 8—Fuel-conservation campaign launched.

Oct. 12—All remaining mines returned; wildcat strikes start.

Oct. 26—Second Illinois agreement rejected by WLB, which says it could approve one with rate of \$8.12½ instead of \$8.50.

Oct. 28—WLB awards anthracite increase of 32c. plus remission of certain charges.

Nov. 1—Mines seized second time after all industry is shut down fourth time; Ickes

authorized to offer contracts based on Illinois decision.

Nov. 3—Ickes signs anthracite and bituminous agreements; approved by WLB Nov. 5; provide for 8¾-hour day with 45 minutes' travel time and 15 minutes for lunch.

Nov. 17—Bituminous wage conferences resumed; 43 mines returned.

Dec. 17—Bituminous operators representing 65 percent of tonnage sign new agreement based on Ickes contract; southern operators abstain.

1944

March 9—New anthracite agreement submitted to WLB; approved April 7.

March 28—Congress passes synthetic liquid-fuel act.

May 19—WLB approves new bituminous contract; southern operators accept it June 16.

June 21—All anthracite and bituminous mines except Jewell Ridge returned.

Aug. 23—Philadelphia & Reading mines seized after dispute over method of making wage payments.

Aug. 31—Organization campaign of United Clerical, Technical and Supervisory Employees' Union of the Mining Industry, District 50, which had been turned down by NLRB in June, precipitates seizure of several score metallurgical properties.

Oct. 7—WPB authorizes applications to produce 37,500 domestic-type stokers.

Oct. 24—OPA allows reconversion to fuel oil in East and Middle West.

1945

Feb. 24—72 mines in Pennsylvania, West Virginia and Kentucky returned.

April 1—Further steps taken to protect key men under 30 in coal and other vital industries.

April 10—235 mines seized in seven states as a result of work stoppages.

April 11—New bituminous wage contract signed providing increases in portal-to-portal and other fringe rates; WLB approves April 23.

April 29—Philadelphia & Reading mines returned after seven months.

May 1—Anthracite stoppage closes mines for two weeks; all operations seized May 3; new agreement providing "fringe" increases of \$1.37½ per day signed May 19; WLB approves June 2; mines returned June 22.

May 7—Supreme Court approves portal-to-portal pay; rehearing denied June 18.

May 8—V-E day.

July 1—Simplified priorities system goes into effect.

July 14—Further limitations on coal distribution announced.

July 17—Drive for release of men, more food, price relief and other assistance culminates in offering of Congressional resolution.

July 20—Shipment of 6,000,000 tons to Europe urged by Ickes.

July 21—Production of mining equipment put on urgency list.

Aug. 14—Japs admit defeat.

by low-cost mines will allow the operator to make a reasonable profit. Old and hopelessly high-cost operations should be promptly closed as the demand recedes.—R. H. SHERWOOD, *Central Indiana Coal Co., Indianapolis, Ind.*



Prospects for postwar Illinois coal mining indeed bright provided fundamental safeguards are erected and hindrances eradicated.

1. Need coal stabilization act providing reasonable minimum prices, thereby assuring continued supply of coal when present low-cost, comparatively short-lived open-pit producers have exhausted holdings.

2. Stable labor situation and no more withering strikes.

3. Continued and enlarged efforts to modernize and improve coal-burning locomotives.

4. Control of competitive fuels delivered via pipelines which do not reflect comparable high labor and transportation costs.

5. Continued improvement of automatic coal stokers, equipment and controls, including meeting the smoke and flyash evils.

6. Real merchandising, producers and retailers alike.—W. J. JENKINS, *Consolidated Coal Co., St. Louis, Mo.*

Coal prospects better than after World War I. The industry needs full support of research by B.C.R., public relations by B.C.I. and of N.C.A.; also, better personnel relations. Competing fuels will necessitate more efficient production, careful preparation and good, reliable service to customers. Domestic stokers must remove ashes now—not after the building boom is over. This all adds up to harder and better work by management.—W. D. INGLE, *Ingle Coal Corp., Elberfeld, Ind.*

My view of the coal industry postwar is on the optimistic side. The rapid trend toward mechanization means lower costs and makes possible maintenance of adequate wage scales. How to improve public and labor relations appears to me to be major problem facing us. I think we will have to meet competition from other fuels with reasonable prices, improved preparation and intelligent selling methods. Full and sincere cooperation between labor and management possibly most important of all factors. We need also to attract young men to coal

mining as a vocation. More labor-saving devices, better housing and recreational facilities, a comprehensive medical and surgical program, job training and improved labor relations are all essential if we accomplish this.—HOOPER LOVE, *West Kentucky Coal Co., Earlington, Ky.*

Consumption of coal in the Middle West will equal or exceed supply this winter. As a result of greatly reduced consumption at war plants and camps and the increased supply and consumption of natural gas by industrial plants, much difficulty in marketing screenings necessarily removed from domestic sizes already is being encountered and lack of markets for screenings may curtail production of domestic sizes. To avoid price demoralization experienced after last war, nearly all producers in the Middle West strongly favor reenactment of Bituminous Coal Act and stabilization by the establishment of reasonable minimum prices.—J. G. PUTERBAUGH, *The McAlester Fuel Co., McAlester, Okla.*



There are many postwar problems of serious import confronting coal industry. Labor problem undoubtedly most important. Have no answer as to how that problem can be worked out

satisfactorily. On the basis of 1,000,000 heat units produced it is a fact that the over-all level of wage rates in oil industry is about one-half the over-all wage level in coal industry. Failure on part of coal industry and those in charge of the union to recognize and meet this problem can only result in large loss of coal business to oil industry and consequent loss of jobs for coal miners. Other than giving consideration to the level of wage rates between oil and coal, the industry will have to give consideration in meeting this problem to more modern and intensive mechanization. Believe intensive research study will develop many ways by which greater mechanization can be introduced in coal mines and production per man per day increased. Furthermore, intensive research in securing greater economic utilization of coal will aid in offsetting loss in volume due to necessity of maintaining a reasonably high wage level.—D. H. PAPE, *Sheridan-Wyoming Coal Co., Inc., Monarch, Wyo.*

I feel that in the next four or five years coal production will be maintained approximately at the same ton-

nage as produced in pre-war years. Some tonnage will go to competitive fuels—gas and oil—but this loss probably will be made up through coal going into chemicals and industrial uses other than producing energy. Coal operators have a stout ally and supporter in the manufacturers of coal-mining equipment and together, under adverse conditions, they have taken care of the heavy wartime requirements. The major problem before the operators is labor relations and only clear thinking and conscientious, concerted action can solve that problem. Long range, there are a number of threats to the coal industry, including atomic energy, hydroelectric power promoted through governmental action and, if we follow the example of England, possible nationalization of the industry. But usually anticipated problems solve themselves.—H. B. CRANDELL, *Clayton Coal Co., Denver, Colo.*



Future prospects for coal mining this area seem uncertain. We do not know what inroads oil may make on our business and it is certain that dieselization of former coal-burn-

ing roads in this area will be a major setback to the coal industry. Major problem confronting industry is to reduce present high costs due principally to high labor cost so that coal prices may be reduced and business expanded. Think determined group action to bring about a sane and practical attitude on the part of labor is most important. The sooner we all get down to the brass tacks of the situation the better.—MORONI HEINER, *Utah Fuel Co., Salt Lake City, Utah.*

With expected industrial development in the West the future of our industry looks brighter than for many years. Our major problems are lower costs of production, better distribution and service on domestic coals and continued stabilization of the industry. Actions necessary to solve these include modernization and further mechanization of properties, making mining jobs more attractive through better housing and personnel relations programs, development of markets to sustain year-round operation and employment, development of more uses for coal through market, industrial and scientific research, more dealers to sell coal or heat as a business and not a side line, development of central heating and a new coal act to prevent

ruinous market practices and promote progress.—E. M. OLIVER, The Oliver Coal Co., Paonia, Colo.

My opinion is production of Utah coal will be approximately 10 percent, or 500,000 tons, less during 1945 than during 1944 and will be reduced another 500,000 tons or perhaps 750,000 tons during 1946. Reduced production will increase per-ton costs. Present per-ton realization is only sufficient to yield small margin of profit and yet the price of Utah coal is too high to successfully compete with competitive fuels.

It would seem, therefore, that the price of coal eventually must be reduced. Labor will exert itself to retain present wages or perhaps to increase them and also will endeavor to obtain other benefits that tend to increase per-ton costs. Since the price of coal must be reduced and since to do so will necessitate reduc-

tion in per-ton costs, the solution of the problem appears to be the complete mechanization of coal mining. In this connection, it is gratifying that priority or rationing system of purchasing coal-mine equipment has been abolished. Equipment manufacturers should do everything possible to enable them to meet increased demand for their product and a large percentage of their equipment should be built to comply with Bureau of Mines standards as to permissibility.—L. E. ADAMS, Spring Canyon Coal Co., Salt Lake City.

Market and labor chief problems. Future prospects for coal mining poor unless market is enlarged through establishment of byproduct plants as a result of continual research for uses of coal other than fuel and coke, union contract written with only one interpretation possible and established wage rates for different districts sub-

ject to adjustments as conditions warrant to curtail labor disputes.—GEORGE B. DICK, Butte Valley Coal Co., Walsenburg, Colo.

In my opinion, the immediate future of coal production is good. I feel that a demand will continue for some time, particularly in the West. The major problems of the industry are maintaining competitive position with other fuels, improving public relationship and a fair and understandable contract with the United Mine Workers. Coal has been placed at a disadvantage with competitive fuels in some territories because of the tight coal market, lack of oil for proper treating during a portion of the last several years, unfavorable publicity about the industry and its relationship with its employees and lack of automatic coal-burning equipment.—PAUL F. KEYSER, Independent Coal & Coke Co., Salt Lake City.

Building for Coal-Mining Progress

PEACE brings no problem of physical reconversion in coal mining. The product remains the same and likewise, to a considerable extent, the facilities and equipment, except for improvements resulting from continuation of the modernization and mechanization that began long before the war. The industry's problems also remain much the same—some diminished and some accentuated by wartime developments. Over all, the big question still is one of making a fair profit on business already available or which can be developed by better merchandising, intensified research and improved service.

How well coal mining fares in solving these problems and thereby capitalizing on its opportunities will be a measure of the business it can expect in the future. What of the present—the next few months? Good, according to present indications. Relief needs, rebuilding stockpiles, winding up the war effort and keeping essential services going during the change-over should utilize all the manpower coal can muster in the next few months.

A longer look into the future reveals an equally substantial basis for optimism. Business activity is expected to reach a new high. It is evident that, starved by what will be four years or more of restrictions and short supply, the people of the United States, not to mention the rest of the world, want a lot of goods. That is one of the best reasons for feeling that

business should be good, and if other business is good the coal-mining business likewise is good. There is, therefore, ground for believing that one of the things coal needs to help it with its problems—a good market—will be present for some time to come.

Consumer need, however, is not a valid substitute for an economic policy based on quality, convenience and low cost with good earnings for employees. Unless quality, convenience and cost are there, competitors will be—and there is no reason to feel that oil, natural gas and hydro power will be any less active after the war than before. In fact, there is every reason to believe that the pressure on coal will be even greater and with it the need for even higher quality, greater con-

venience and cost equality if not advantage—preferably the latter.

Keeping present business, getting more business and giving employment at good wages is, in the final analysis, the responsibility of management—management working with men and machines to achieve the overriding goal of a maximum service to the consumer. Management is the key to the future in coal mining, and the ability it shows in meeting and solving the industry's problems will be reflected in the degree to which coal can capitalize on its opportunities. To assist management, *Coal Age* contributes the following discussion of some of the major problems and how their solution can help coal capitalize on its opportunities.

EFFICIENCY: NO. 1 GOAL

Key to the No. 1 weapon against competition—low cost; best guarantee of expanded running time and good wages for miners.

The average value of bituminous coal at the mine probably reached \$3 in 1944, including selling expense, for the first time since 1922, when the figure, excluding selling expense, was \$3.02. Average sales realization for anthracite was \$5.91 per ton in 1944, exceeded only by \$6.11 in 1926. Bituminous output per man was 4.28 tons in 1922, rising to an estimated 5.6 or more in 1944. Anthracite output per man was 2.09 tons in 1926 and

2.79 in 1944. Increased mechanical loading underground has figured in the increase in both industries, with stripping as an added starter plus, in the anthracite region, a sharp increase in bank recovery in the past two or three years. In anthracite, in fact, credit for most of the increase in individual productivity goes to increased stripping, bank work and dredging.

By its courage in investing its money and its efforts in increasing produc-

tivity in the years since World War I, the coal industry in effect pulled itself up by its boot straps, saved itself from possible government confiscation, greatly improved its quality and service and did an outstanding job in World War II while losing a large percentage of its working force. Not only that; coal has saved consumers billions of dollars on their fuel bills in the face of steadily rising wage rates, shorter working hours and increases in the cost of equipment, materials and supplies. If the 1922 productivity per man had still prevailed in 1944, the value of bituminous coal probably would have been over \$4 rather than \$3 per ton, or more than 33½ percent higher, while the figure for anthracite probably would have been \$7.50 or more instead of the actual of \$5.91 for 1944.

The coal industry, however, is in no mood to rest on its laurels; witness one operator's statement that "We're placing orders for \$5,000,000 worth of new mining machinery as soon as this was is over, and more as soon as we can get it." Two facts give some indication of the opportunities:

1. Less than half (48.9 percent) of the underground bituminous tonnage was being handled mechanically in 1943. In anthracite in 1944, the percentage was 35.8.

2. The majority of the mechanical-loading units now in service, most authorities contend, are not reaching the efficiencies and outputs they should by 25 to 50 percent or more.

Experience has proved that modern mechanical-mining equipment and better methods can materially increase the output of present equipment and the men who operate it. Hand loading undoubtedly will remain for a part of the nation's tonnage, but, as W. H. Young and R. L. Anderson show in the June *Coal Age* (pp. 101-107), it runs a bad second to mechanical loading with an output of 4.26 tons per man-shift against 6.62 with machines and 15.15 in stripping. Similar figures are not available for anthracite but an estimate from those that are indicates that mechanical mining has resulted in an increase of around ¾ ton or more per man-shift.

Many deep operators have their sights set at the strip figures and are confident they can reach them. Not all are so fortunately situated but there is no reason to believe that even with present equipment industry averages of 10 tons per man-shift in bituminous and 5 tons in anthracite by 1950 are impossible. In fact, they may be necessary, but in any event the reduction in cost should go a long way toward solving coal's primary problem as well as many related ones.

QUALITY: POTENT SALES TOOL

Protects markets by providing greater efficiency and convenience in use through impurity reduction, uniformity and correct sizing.

Quality and convenience with lowest cost are the standards by which consumers, when they have the opportunity, make their choice between competitive products. Coal is no exception to that rule. Consumers have been willing to accept some deviations from usual standards during wartime but with the return to peace they will insist on maximum quality and convenience for their dollars.

Cost has long been one of coal's major talking points but appreciation of the importance of quality and convenience is reflected in the activity in new preparation construction in recent years. As soon as restrictions on materials are lifted, this activity undoubtedly will rise to pre-war levels and higher. So far, as an example, only 25 percent of the total bituminous output is mechanically cleaned. What the eventual total should be is a matter of speculation, but the undoubted advantages of mechanical cleaning forecast increased installation, along with

other construction to accomplish the following objectives:

1. Decreased impurity content.
2. Greater uniformity of product.
3. Decreased labor requirements.
4. Higher efficiency in sizing.
5. Elimination of excess moisture and freezing.
6. Freedom from dust during delivery, storage and use.
7. Freedom from tramp iron and other foreign material.
8. Increased coal recovery through higher cleaning efficiency, re-treatment, salvage of coal from mine refuse and recovery of fines to augment tonnage and reduce stream-pollution.
9. Increased crushing, rescreening, storage and mixing facilities for greater flexibility in sizing.
10. More blending to improve cleaning results and provide a better, more uniform product.

In the days to come, the best possible coal preparation will pay off in improved market opportunities.

RESEARCH: MARKET KEY

Protects and expands existing markets by making coal more efficient and convenient; reveals new markets and insures coal's advantage therein.

Atomic power is the new "glamor" source of energy. But the real trouble for coal lies in the old "glamor" fuels—oil, natural gas and hydro power. Prof. H. D. Smyth, of Princeton, author of a report on atomic power released by the War Department, expresses the belief that use in industry will be a matter of slow growth over a period of many years. He sees "no immediate prospect of running cars with nuclear power or lighting houses with radioactive lamps, although there is a good prospect that nuclear power for special purposes could be developed in ten years."

Meanwhile, oil, gas and government, hydro power are very much with the coal man. While the outlook is for continued pressure from coal's old foes it would have been a much darker outlook except for one thing—research. Research into more efficient combustion methods and equipment, into smoke elimination and other aspects of coal use and into improving the quality and convenience of coal has limited the inroads of competition and

prevented much larger losses of tonnage—this in spite of the fact that funds have been much less than warranted by the size of the problem.

The anthracite "heat jeep," improved stoves and stokers, overfire steam-air jets and other advances in the use of coal are the direct products of research, as well as evidence that it can deliver the goods and that the public and industry will buy them. The future promises other major benefits. Among them, as a result of the project set up by the Locomotive Development Committee, it seems highly likely that coal will get in on the ground floor in fueling gas turbines for locomotive and a number of other applications.

Coal need not, however, limit its horizons to fuel uses in solid or powdered form. Convenience, a growing factor in merchandising, may dictate converting coal into liquid or gaseous forms for household and other services. Production of motor fuel and other liquid products from coal is by no means improbable and would open

up a vast new market. Numerous other products are based on carbon and carbon compounds. By expanding research and supporting it to the hilt coal can insure that it gets its share of

this new business. Equally important, it can insure its ability to meet competition and retake lost ground in present markets by making its product cheaper, more efficient and more convenient.

MERCHANDISING: SALES EXPEDITER

Builds tonnage through relating product to consumer needs, desires and equipment, better service and modern promotion methods.

Whether coal will ever again move into a buyers' market as pronounced as it has experienced at times in the past is a matter of speculation, but, as previously pointed out, the outlook is for good business for some time to come. However, the advantage undoubtedly will be with the purchaser and that leads to a consideration of merchandising, the link between producer and user—particularly a user with a choice and subject to the siren song of competitors.

From a start with study of the nature of the product and what can be done to make it better suited to existing equipment, investigation of merchandising possibilities goes on to a further question: "When coal has been improved to the utmost, is there an additional opportunity in equipment designed and engineered for greater flexibility and efficiency with coal?" The answer is yes. Anything coal can do to promote the development and installation of more efficient and convenient burning equipment—equipment providing the user with a clear-cut cost and convenience advantage—is well justified by improvement in its competitive position.

Sound merchandising also includes following the product to make sure that the user gets his money's worth and is completely satisfied. In other words, it includes service, and this service involves not only the producer but any of the organizations—principally retail—through which coal moves to the user. To overcome the limitations involved in establishment of individual service agencies, many concerned with the problem feel that an industry organization would yield the best results for the money expended.

The increased number of combustion engineers employed by coal companies, as well as the growing number of cooperative producer-dealer set-ups, is evidence of the increasing awareness of the value of service. Reams could be written on the need for a better working relationship between producer and retailer to the end of increased consumer satisfaction but the situation might be summarized by saying

that since the dealer is a vital contact between John Q. Public and the coal industry, his service should be nothing short of the best. In attaining that goal, he should have the complete support and cooperation of the producer and wholesaler.

While coal as coal, as stated, remains the most satisfactory for most industrial uses it leaves the smoke problem unsolved except as it is alleviated by more efficient burning equipment and methods and the use of such auxiliaries as the overfire steam-air jet. Converting coal to a smokeless fuel yielding salable byproducts is one solution advocated by many within as well as outside the industry. Study of this phase of the merchandising problem also leads to speculation on the broader question of whether coal should stick to coal or go into the manufacture and distribution of the products of coal.

Industrial markets offer some examples of hot competition but no hotter than home heating and com-

mercial uses, the cream of the crop for bituminous and the mainstay of anthracite. Should coal continue to offer coal alone or coal with improved automatic equipment? Should it go to a heating service entirely relieving the user of any duties in connection with heating, air conditioning and hot-water supply? Should it convert its product into the "pushbutton" type—gas or liquid fuel?

Cost still is a major item to many consumers and probably will remain so but if added convenience can be had for the same or only slightly greater expense it is logical for convenience to be the deciding factor. Oil and gas installations made in recent years are evidence that many users rank convenience over a moderate increase in cost and therefore promote that factor to a leading place in coal merchandising. More automatic equipment, expansion of heating-service plans and promotion of programs designed to convert coal into a more convenient fuel thereby become prime objectives automatically.

With study of product, applications, equipment and conversion possibilities, merchandising also involves telling coal's story forcefully and continuously both directly (sales and service men) and through advertising (radio, newspaper, magazine, direct mail, etc.). Such work complements public-relations work but has a different objective: presenting the advantages of the industry's product, selling the industry's service and backing up the work of its sales and service men.

LABOR RELATIONS: COOPERATION GETTER

Management and men working closely together promote industry progress and good will by insuring uninterrupted service at low cost.

Coal still is over 60 percent labor. Consequently the hopes, fears, desires and convictions of the miner inevitably exert a major influence on coal-mining progress and on the relations of the industry with the public and government. There is no question but that contract wrangles and their accompanying stoppages and strife have been the underlying factor in adverse public opinion and attempts at government regulation up to and including nationalization, as well as the low opinion of operators still cherished by many miners as brought out by Whiting Williams in "What 25 Years Have Meant in Coal-Miner Thinking" (November, 1944, Coal Age.)

Money inevitably enters into the question of relations between employer and employee but there is quite

a bit of evidence that it is not head and shoulders over everything else. Most authorities agree that good wages are no small factor since they add to the sense of security and satisfaction that are accepted by these authorities as foremost in worker thinking. But a few nickels or dimes a day one way or the other are held to be less important in molding worker attitude than the conviction that he has a secure, regular job in an industry which he feels is well managed and is going some place.

Nursing old prejudices and with plenty of people, willfully or because they are unthinkingly parrot propaganda, to remind him of his fancied wrongs, how is the miner to learn the truth? The answer is that if he gets it any way it will be through his em-

ployer. The appeal may be direct, reinforced by fair treatment and every possible effort to increase security and provide maximum opportunities for earnings. It may be indirect, although no less powerful, through getting the facts before the public and its representatives and servants in government, thus stopping one flow of erroneous information at the source. The facts include the outstanding one that participation in the benefits of progress carries with it the responsibility for raising the standing of the industry by increasing productivity. In fact, without that increased productivity, in which the miner has as much a stake as the operator, there might well be nothing but losses.

Disasters and erroneous impressions as to conditions under which miners work and live play a major part in employee thinking, public opinion and governmental attitude toward the industry—as coal mining well knows from past experience if not from recent radio and newspaper comment. Anything done to reduce still further injuries and fatalities in mining therefore is bound to be reflected in improved industry standing as well as in lower cost and increased realization.

Improved working conditions automatically follow advances in safety but safety is not the only road to betterments benefiting the industry. Equally important are living conditions, since a large proportion of the industry's working force resides in communities operated by the mining companies. Company stores and company towns have provided coal-industry baiters with a great deal of their ammunition over the years. For that reason, if no other, coal can afford to supply no less than the best in housing and community services, including stores, schools, churches, playgrounds, recreation centers, water and sewage systems, medical and health facilities and all the other things that make home life better. Men who appreciate these things are willing to pay a fair price for them and such men are the steadier, more reliable and more efficient miners that progressive companies need and want. The satisfaction of these men with the living facilities afforded them inevitably is reflected in a better opinion of the industry in which they have a part, paralleled by a corresponding improvement in public opinion. This conclusion is confirmed by many companies that have put the matter to the test.

Improving labor relations will continue one of coal's primary concerns for some time to come—if for no other reason because the public now expects management to do everything it can to improve the lot of the worker. The

ultimate goal in coal is a working or cooperative relationship satisfying both parties, eliminating stoppages and guaranteeing uninterrupted service at lowest cost to the consumer. The job is no small one and much of the bur-

den will fall on management, which at times is bound to feel that Job's trials pale into insignificance alongside it. But the results in industry progress should apply the incentive and the reward.

PUBLIC RELATIONS: GOOD-WILL BUILDER

Correcting erroneous impressions and showing industry accomplishments by making the facts known build public and employee good will.

No industry can achieve maximum progress when it is burdened by adverse public and employee opinion, whether that opinion be correct or, as in the case of coal mining, rooted in lack of knowledge, false impressions and erroneous statements unknowingly or willfully circulated by conclusion jumpers and axe grinders. It is axiomatic that people like to do business with an industry or organization they believe is well managed, treats its employees fairly and is going places because they figure they are more likely to get quality and service with economy. Coal can fairly qualify on all these accounts, as its war record, employee earnings and improvements in plant and working and living conditions convincingly show.

Are these improvements and others to be made in the future enough in themselves to insure good will? The evidence is to the contrary and therefore coal mining has followed the example of many other industries in

setting up organizations to carry on public-relations work. Simply by presenting the facts these organizations already have made real headway in changing the public's picture of coal mining and in capitalizing on a latent desire to give coal credit for at least some accomplishments, as indicated in the Coal Age sampling of opinion presented in the September, 1943, issue.

In spite of progress, recent incidents have demonstrated the need for continuing and strengthening public relations work. Good public and employee opinion is the best insurance against restriction, regulation and attacks by self seekers. Likewise, it is the best assurance of continuation of the industry as a free enterprise offering economical service with good wages to employees and fair profits to investors. The results are the best reason for added support for the industry-wide programs and for increased regional and individual efforts.

FREE ENTERPRISE: ULTIMATE GOAL

Willingness to tackle and solve its own problems and to work for better relations with government assure preservation of free enterprise.

The citizen and industry—especially the latter—find government a much bigger factor in their affairs these days. Debating the merits of the question does not alter the fact that the preponderance of opinion now is in favor of government taking a greater hand in industry, especially when, rightly or wrongly, there is an impression that industry itself is unable or unwilling to solve its own problems and, particularly, provide the employment and earnings that public opinion deems fair to workers. Then there are, among other things, taxes, conservation of natural resources, public development of those resources, regulation of relations between competing organizations and industries, subordination of State and local to federal authority and growth in administrative law and rule

by executive action—in short, a trend toward increasing jurisdiction over the actions of industries, corporations and individuals paralleled by increasing concentration of power in the hands of federal officials and agencies.

Some of these developments have been initiated with sound ends in view, some have been forced by business baiters and some are the result of wartime exigencies. In some cases, likewise, the results have been good, but more often there is ground for contending that they have not proved adequate substitutes for freedom of enterprise—which, despite its defects, still built the nation to greatness and enabled it to put forth a war effort second to none in history.

Congress and, back of it, public opinion still are the final authority on

how far the trend toward government in business will go. Industry, therefore, must look primarily to Congress and the public for protection against ill-considered and self-seeking attempts at punitive action, regulation and confiscation. As a first step, of course, industry must be able to make out a good case for itself, since standing well with the public, as has been stated, is a real asset when an industry is attacked. In fact, it prevents most of the attacks.

Important as the many other subjects are, the possibility of renewed federal control over bituminous prices and marketing operations is an outstanding matter for the future. Previous coal acts were, in fact, invited by a majority of the industry and sentiment still is strong for a new one in the near future, although some of its advocates join with its opponents in seeing it as meaning progressively tighter and tighter control over the operations of the industry substantially paralleling railroad regulation.

Should coal again invite federal control over prices and marketing operations? Many operators while, as stated, admitting its disadvantages, see it as about the only way out. Others ask: "Is it?" Some of these see the solution as individual backbone—refusal to sell at a loss. If costs are low, these men hold, the only thing a price cutter can do is sell at a loss, and even when he does he will find it impossible to take all his competitor's business, which means that about all he can do is raise his quotations or eventually go broke. If each company got its cost down and then refused to sell unless a profit could be made, there would be no need for regulation from the outside.

Less sanguine operators, however, while not liking the thoroughgoing nature of a price and marketing act similar to those under which the industry formerly operated, still feel that there may be a place for regulation. Among other things, they propose a compromise providing a considerable measure of control but keeping that control in the hands of the industry, subject only to intercession by some government agency when it appears that operations of the industry organization are likely to burden commerce. In other words, the sales agency plan would be accorded statutory exemption from the anti-trust acts similar to that accorded agricultural cooperatives under the Capper-Volstead and other acts. Thus, machinery would be provided for prevention of ruinous price cutting and the public would be protected by the power of intercession granted an appropriate government agency or department head.

The problem of stabilization added to the others previously set forth might make it appear that the future is all problem and little profit. Such is not the case. None of these and other problems are insurmountable and, in fact, coal's war record and the advances made in previous years are evidence that a real start has been made on the solutions—solutions that can obviate the necessity for accepting help from the outside and thus taking the step that even some of those willing to do so admit would be a confession of weakness.

Coal was making definite progress before the war and has no less an opportunity for profitable service in the immediate as well as the more distant future. By drawing up and living by its own charter—a charter embracing low cost, quality, better service, research, better relations with employees, promotion of safety and welfare, public relations and cooperation in the formulation of good government policies—it can prove its right to continue as a free enterprise serving the public well, paying good wages to miners and returning reasonable profits.

COAL-MINING CHARTER

HIGH EFFICIENCY—Maximum utilization of modern equipment and methods to insure low prices, whip competition, increase running time, pay good wages and return reasonable profits.

HIGH QUALITY—Maximum impurity reduction, correct sizing and maximum uniformity for efficiency and convenience in use and improvement of coal's market position.

MODERN MERCHANDISING—Maximum utilization of product knowledge, accurate market information and modern burning equipment, plus modern sales promotion and service, to win and hold consumers for coal.

RESEARCH—Thoroughgoing and expanded study of coal and coal utilization to protect and extend present markets, discover new markets and establish coal therein.

SOUND LABOR RELATIONS—Promotion of co-operation between operator and miner for industry progress through maintenance of low-cost service and elimination of interruptions in supply, thus insuring continued public good will.

SAFETY PROGRESS—Maximum advances in safety, health and welfare to cut cost, gain favorable public opinion and improve miner attitude.

GOOD PUBLIC RELATIONS—Expanded support of programs showing industry accomplishments, correcting misinformation and eradicating prejudices to build public and employee good will.

SOUND GOVERNMENT RELATIONS—Cooperation in the development of government policies designed to insure continued freedom of enterprise and enable it to serve the public better.

LOADERS AND SHUTTLE CARS

Speed Development at New Oliver Mine

Drift Driven Through Loose Burned Shale and Coal—Mine Developed on Plan Using Pitch of the Seam to Provide Favorable Grades for the Haulage System—Bottom Coal Left as Roadbed for Shuttle Cars

By **R. C. OLIVER**
President, Oliver Coal Co.
Somerset, Colo.

And **R. R. RICHART**
Assistant Editor, Coal Age

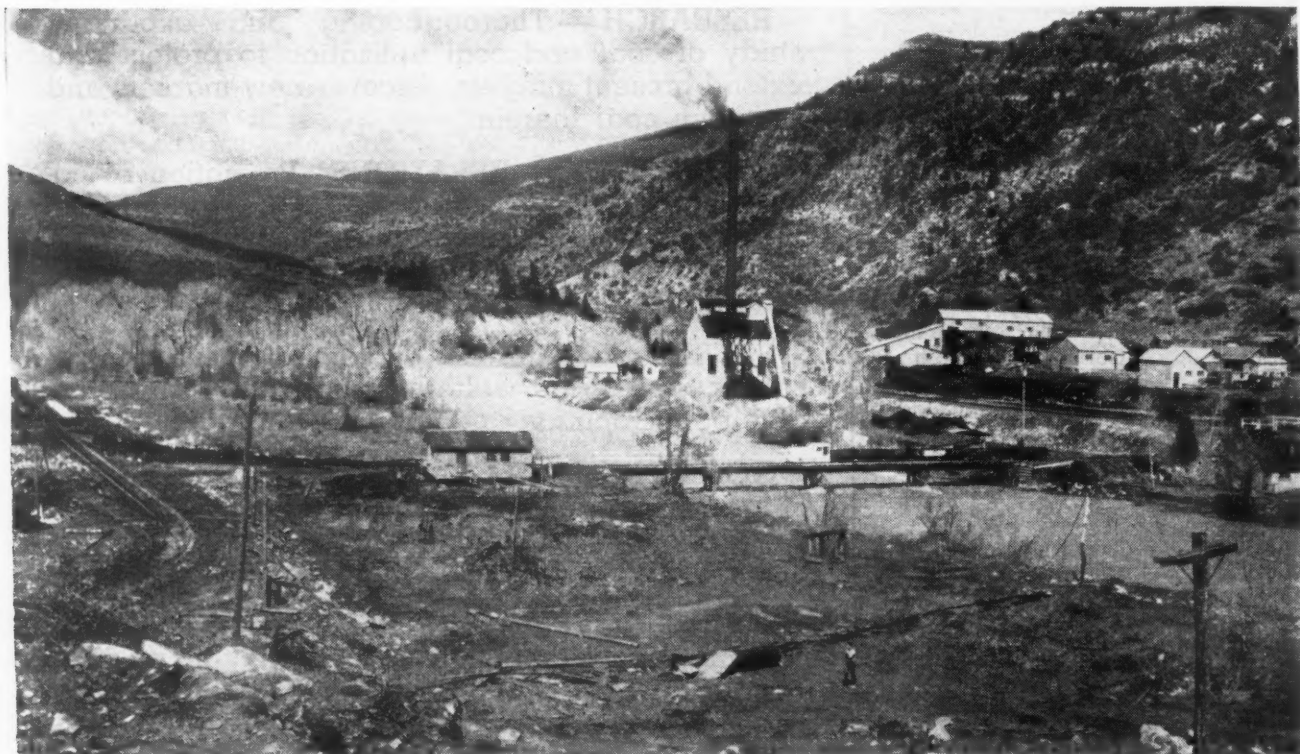
LOADERS and shuttle cars are setting a fast pace in the development of The Oliver Co.'s new mine, not yet a year old, located near Somerset, Gunnison County, in western Colorado. One operating unit, comprising a loader and two shuttle cars manned by a ten-man crew, averages approximately 375 tons per shift. The old mine, described in the June, 1943, *Coal Age*, was forced to suspend after operating 17 years on the north side of the canyon because the seam gradually

pinched out. In July, 1943, the company started prospecting across the river (North Fork of the Gunnison) along the south side of the canyon. A tract of coal approximately two miles square was leased and development work was begun Nov. 18, 1944.

Four mines are working four different minable coal seams along a three-mile stretch of the Gunnison River in this region. The new Oliver operation, like the old, is in the Mesa Verde sandstone formation of the West Elk Mountain. The 18-ft. seam being worked, the lowest in the fresh water formation, pitches 6 percent N. 23 deg. E. and has many local rolls. The bottom 6 ft. of the seam is very dirty and the coal from it cannot be marketed without the aid of crushing and washing facilities and, therefore, is being left for the time being. Of the

upper 12-ft. portion of the seam, 7½ to 8 ft. is mined on development. The remaining 4 or 4½ ft. is left as top coal for roof protection and will be recovered on the retreat.

In opening the drift for the new mine, a 275-ft. tunnel was driven through loose burned shale and burned-out coal before good coal was reached. This tunnel is fully lined with semicircular sections of corrugated tunnel liner plate bolted to a 24-in. high concrete footing along each side. To the east, which is up the canyon, is the return aircourse, also protected by a steel and concrete lining to the point where good coal is encountered. After both headings, which lie almost in the center of the property east and west, reach the unburned area of the seam two more are picked up. The plan is to continue



Coal from the new drift operation is hauled across the river to the tippler.

driving the four headings up the pitch at a grade of approximately 5 percent (slightly off the 6 percent pitch of the seam) to the boundary of the property, about two miles. About the center of the property, north and south, a 1,000-ft. barrier pillar will be left for protection against a squeeze while the near half of the property is being mined on the modified block or room-and-pillar method. However, no pillar work is scheduled for the first three years of operation.

At present, the four 12-ft. headings on 62-ft. centers (protected by 200-ft. barrier pillars) are being driven in accordance with a plan that will lend itself to the use of either a hoist or locomotives for handling the coal down the pitch, whichever scheme is finally adopted. The two inside headings are used as intakes and the outside ones as returns. At a point 1,000 ft. in from the mouth of the drift, four headings have been turned to the east and to the west and are numbered one to four from the inside out. Crosscuts are driven on 60-ft. centers and on a 60-deg. angle between No. 2 and No. 3 headings. Between No. 1 and No. 2 and No. 3 and No. 4, the crosscuts are at intervals of 100 ft. While the seam is subject to local rolls and pitches, the coal left in the bottom and top will permit adjustments in grade suitable to shuttle-car operation.

Plan Favors Haulage

The east and west entries are driven on an angle to provide a grade of 1½ percent in favor of the loads. All rooms will be 14 ft. wide and to work them up the pitch those on the west will be turned at 90 deg. to the heading and those on the east at 72 deg. All partings are driven 16 ft. wide to accommodate 42-in.-gage tracks laid on 6x6-in. x 6-ft.-long untreated lodge-pole pine ties. After the war the management expects to obtain red spruce ties again. No bonding is necessary on the 30-lb. steel, used wherever track is necessary, since only battery locomotives are employed for track haulage. Furthermore, the track circuit forms no part of the electrical circuit feeding the equipment at the face, which operates on 3-phase 440-volt a.c. power.

Like other properties, the Oliver mine has experienced a shortage of manpower. It too has learned that it pays to man one territory fully at the expense of another. As a result a ten-man crew in one territory, where two Type 42-D-7 Joy shuttle cars serve a 7 BU Joy loader, consistently produces 375 tons per shift. About 14 cuts are loaded out per shift, with each cut pro-



The loader is equipped with a spray nozzle (above headlight) to keep down dust.



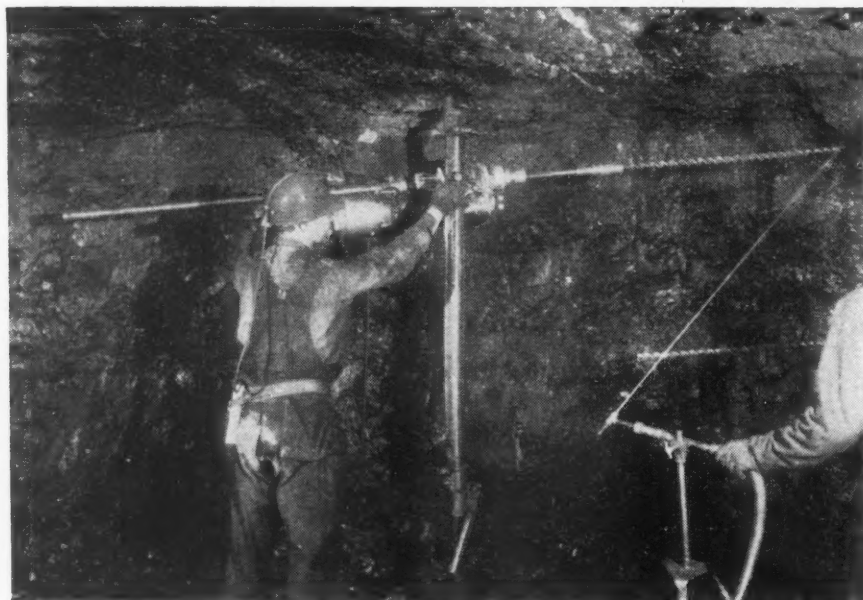
Two battery-powered shuttle cars serve one loading machine.



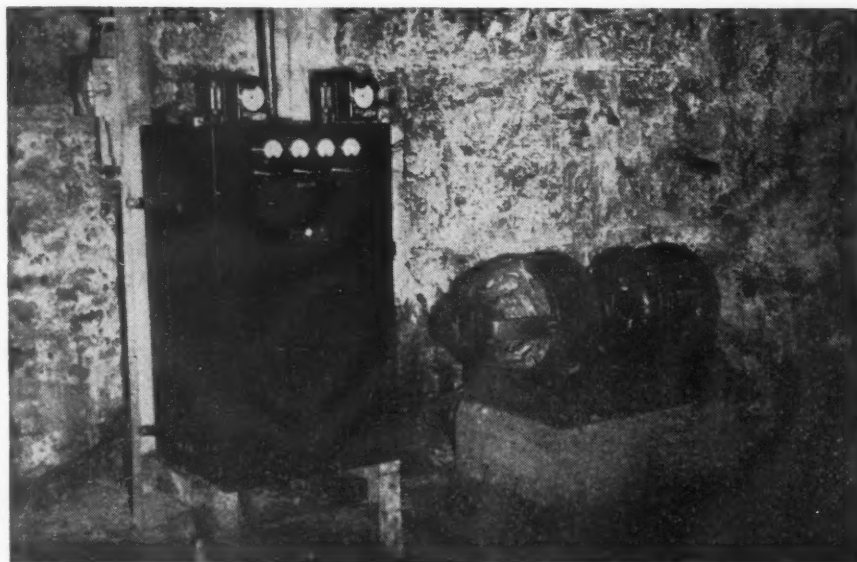
Shuttle car uses ramp of solid coal to load directly into the mine cars.



All machines at the face, including this shortwall, use 440-volt. a.c. power.



A jet of water allays dust during drilling.

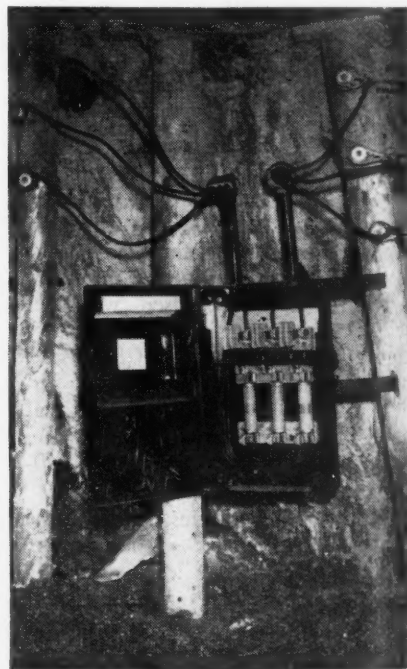


One of three automatic units used for charging shuttle-car and locomotive batteries.

ducing approximately 28 tons. The crew consists of a loader and helper; cutter and helper; driller and helper; shotfirer; two shuttle-car drivers; and one man at the car-loading station. Part of the time the other territory has only an eight-man crew. Nevertheless, this crew often loads more than 175 tons per shift with only one shuttle car to serve the loader. Some days it is necessary to stop production from this crew and use the men to catch up on the dead work. Although this hurts production, the management realizes that the operation is in a very dry and dusty seam and, therefore, takes every precaution to keep it a safe mine.

Coal Ramp Used

All shuttle-car hauls are held to 500 ft., one way. At the unloading point, where a 7-percent ramp made of solid coal permits dumping directly into the mine cars, top coal is taken down to afford headroom for the shuttle car and its operator. At one unloading point a Type PL117H Joy elevator speeds up operations by eliminating the wait for car changes. An accompanying illustration shows one of three automatically controlled charging units used for charging five Type TLM 360-amp.-hr. Exide-Ironclad batteries for shuttle cars and a Type KMD29 Gould and two Type MVM29 Exide Ironclad batteries (all 44 cells) for battery locomotives.



The 440-volt circuits are fused and provided with disconnects at sectionalizing points.

All undercutting is done by Sullivan 7B shortwalls equipped with 74-ft. bars and either Type JL or JM Bowditch chains. Each machine is powered by a 50-hp. 440-volt motor and is moved about the territory on a Type T1-1H Joy truck. The coal is friable and, therefore, easy to cut. Water is used on the cutter bar to eliminate the spreading of the dust. In undercutting the face the machine men are required to make the bottom of the cut 39 in. below the free parting. This leaves a 4-in. layer of coal above an 8-in. shale band in the dirty section of the seam not mined as a suitable roadbed for the shuttle cars.

Eight holes (two level rows of four each) are drilled to a place with Jeffrey A6 post-mounted drills using thread-bars with a 43-in.-per-minute feed. A stream of water directed at the mouth of each hole keeps down all dust during the drilling operations. The top row of holes is drilled 6 in. from the top and the bottom row 45 in. from the floor. Outside holes are spotted 6 in. in from the ribs and the two inside holes divide the intervening space into three equal parts. All holes are drilled straight in. By double capping both top rib holes and using a du Pont Gelobel permissible fast rock powder a good yield of lump coal is had. Clay dummies, purchased at 1c. each, are used for stemming. The eight holes are fired in the following order; two bottom inside holes; two bottom outside holes; top right inside hole; top left inside hole; and both top outside holes. As soon as the Cardox building is finished Cardox will be used for breaking down the coal.

Battery Locomotives Switch

The hazards of a trolley installation and the cost of bonding have been eliminated through the use of battery locomotives for all inside switching of mine cars. One 5-ton General Electric and two 6-ton Westinghouse locomotives handle the movement of trips of 2.3-ton wooden and 3-ton steel mine cars (all equipped with anti-friction bearings) in and out of the mine from the outside interchange yard. Between the interchange yard and the tippie a 7-ton Whitcomb diesel locomotive handles the cars at a fuel cost of 30c. a day.

The electric power is purchased at 2,300 volts from the Western Colorado Power Co.'s power plant next to the tippie. The 2,300-volt power goes via 3,000-volt parkway cable to two underground three-phase transformer stations, 75 and 90 kva. respectively. The secondary, or 440-volt, side feeds the underground system serving the



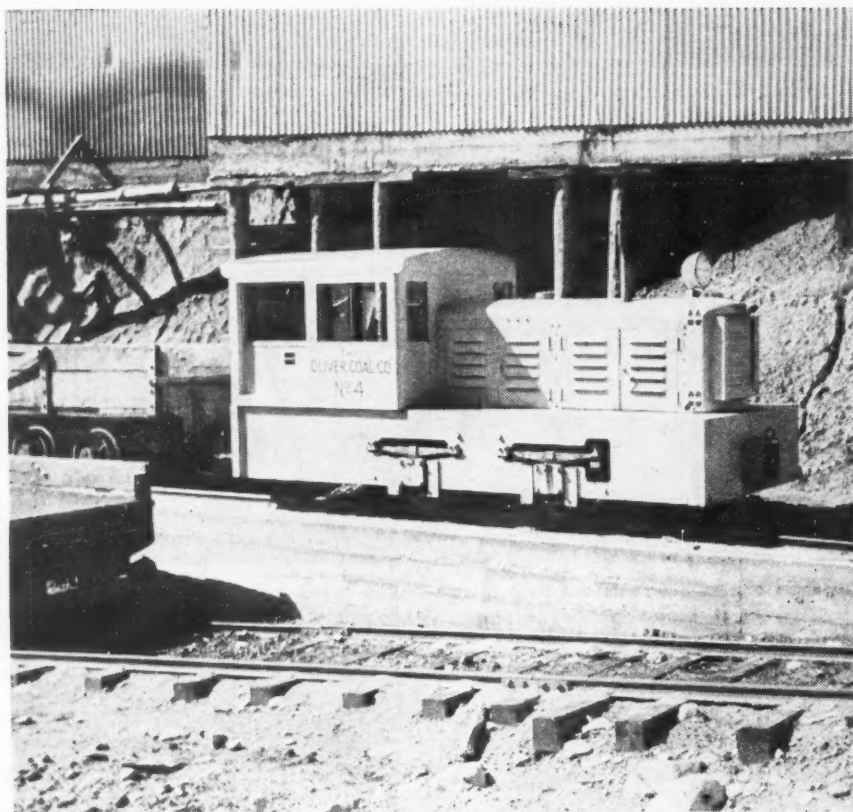
For short entries overcasts are built of thin-walled galvanized pipes 4 ft. in diameter supported on 30-lb rails.



After the top is pulled down, dinosaur tracks are often found in the roof.



Steel tunnel plates line that section of the main entry located in the loose burned shale and burned-out coal.



A diesel locomotive is used to move the mine cars between the interchange yard and the tipple.



Left to right: Albert Wiley, section foreman; Ronald C. Oliver, president and general superintendent; and Carl Smith, foreman, Oliver Coal Co.

face machinery, battery-charging units and ventilation equipment. These distribution circuits have sectionalizing points where fuses and disconnecting switches are provided. All machines used at the face are supplied with fused nips.

A single-stage 6-ft. Jeffrey Aerovane fan driven by a 20-hp. motor supplies

40,000 c.f.m. of air to the mine. Permanent stoppings are built of concrete blocks. For ventilating entry sections of 1,000 ft. or less a galvanized-pipe overcast is used. Three 48-in. diameter pipes, soldered airtight and swaged for stiffness, are supported by 30-lb. rails. Permanent overcasts for ventilating the main east or west en-



E. M. Oliver, general manager of the Oliver Coal Co., has his headquarters at Paonia, Colo.



Mark Schlangen, preparation manager, looks after quality of product at Oliver mine.

tries, which are upward of 3,000 ft. in length, are constructed of concrete blocks with reinforced concrete floors. In the working territories room blowers and tubing supplement the main ventilating equipment. Rock-dusting is done periodically. During the three principal operations at the face and while shuttle cars are discharging their loads large volumes of water are used to keep down the dust.

The Oliver Coal Co. is jointly owned by R. C. Oliver, president and general superintendent; E. M. Oliver, general manager; and J. O. Hovgard, in charge of sales. The supervisory force at the mine is as follows: Carl Smith, foreman; Albert Wiley, section foreman; Mark Schlangen, preparation manager; and Frank Hodgson, master mechanic and electrician.

The **ATOM** **NEW SOURCE OF ENERGY**



A Tide in the Affairs of Men

On August 6, 1945, an atomic bomb exploded over the Japanese city, Hiroshima.

Its concussion blasted the city, vaporized the fibre of Japan's will to resist, and flashed across the world a light of such glaring intensity that even blind eyes could glimpse the forked road that is presented to humanity's choice and destiny.

It has been a scant fifty years since Pierre and Marie Curie embarked upon their research with the avowed intent of discovering "how the atoms of the universe are put together". Their work contributed radium to the knowledge and use of mankind, but it marked only a way station upon the awesome quest which they announced and which thousands of scientists have since pursued.

Under the compelling stimulus of war, the first major application of the release of atomic force has been in an instrument that raises by an unimaginable dimension our ability to dole out death. We can be devoutly grateful that the scientific leadership of the Allies, and particularly the industrial strength of the United States, brought to us, rather than to our enemies, priority in the development of this dread weapon. But even in its present infant phase, it is clear that ownership of the principle of the atomic bomb carries a trusteeship of terrifying gravity.

We hold in trust a power that is capable of unraveling the very fabric of our civilization.

Equally, it may be susceptible of development as a mighty force for human welfare. But we have proved the destructive use, while the constructive applications are still in the realm of speculation.

Clearly the trust is of a magnitude that transcends national jurisdiction. No walls have ever been built high enough to fence in the spread of scientific knowledge, and even if we were resolved to forego the harnessing of atomic power for peace, it is hopeless to think that its application for war can be held for long as the monopoly of one, or a small group of nations.

At one giant stride our scientific and technological development has so far outdistanced our social engineering, that we have no choice but to turn our full powers of creative imagination to control the forces we have unleashed and to bend them to man's use rather than to his destruction.

Since control is not possible without understanding, I have asked several of my editorial colleagues in the McGraw-Hill organization to present on the pages which follow a non-technical but authoritative account of the known facts and implications of atomic power.

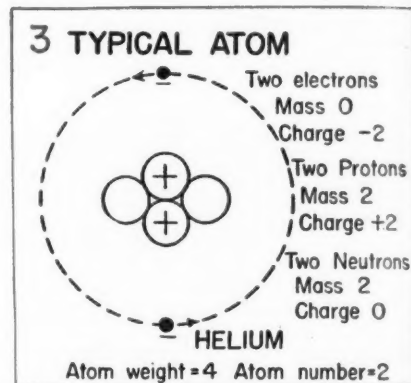
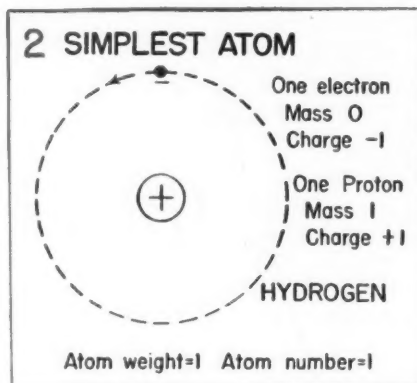
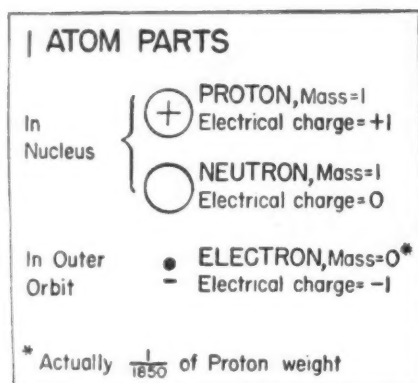
James H. McGraw, Jr.
President, McGraw-Hill Publishing Co., Inc.

HOW ATOM SPLITTING

Five years ago the world learned that the atom of Uranium 235 had been split, releasing energy at the rate of about 11,400,000 kilowatt-hours per pound. The whole amount tested was less than the head of a pin, but there was no escaping the possibility that heaters, engines, turbines, jets and explosives could be powered by atomic energy. Then began the race to win the war with atoms.

With what help England could give, America outran the best atom-splitting team Germany could muster. It was all done in silence. From the summer of 1940 until the atomic bomb blasted Hiroshima, black secrecy blanketed history's most amazing scientific and industrial accomplishment.

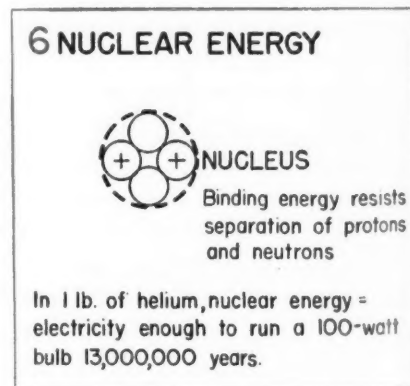
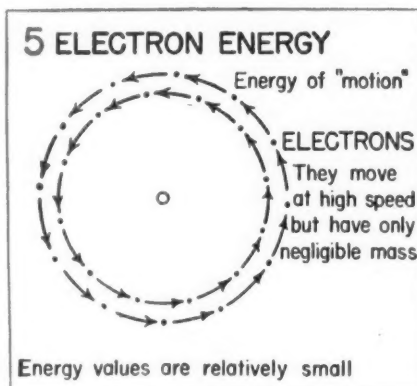
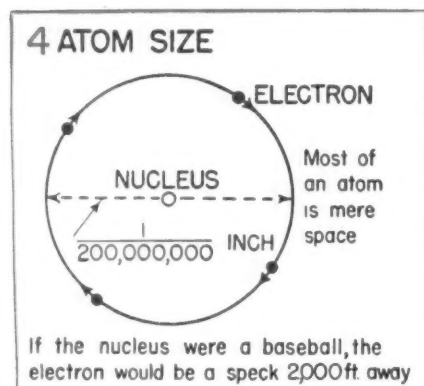
Coldly scientific in form, the War Department's "Smyth Report," released August 12, 1945, traces



Each of the 92 elements has its own *atom*, yet all atoms are made from the same three pieces, Fig. 1: *proton* (weight 1, electric charge +1), *neutron* (weight 1, charge 0), *electron* (weight 0, charge -1).

Every atom is a tiny "solar system." Its central "sun" has one or more protons, generally neutrons too. The revolving "planets" are electrons, one for each proton in nucleus, because plus and minus must balance in the atom.

The opposite charges attract, but high speed keeps the electrons out in their circular orbits, just as the centrifugal tendency of the revolving earth defies the sun's gravitational pull. All the weight of an atom is in the nucleus, so add the number of protons and neutrons to get the atom's weight. The *atomic number* is equal to the number of protons. The elements are known by their atomic numbers. Thus uranium (92 protons) is element 92.



With only their outermost orbits touching, it would take half a million atoms to span the thickness of a human hair. Yet if one could expand an atom until its outer orbits encircled 100 acres, the nucleus would be no bigger than a baseball. The atom is mostly empty space, Fig. 4, and nuclei are difficult targets; so much so that a neutron bullet fired at a mass of atoms may pass right through without a hit.

The almost weightless speeding electrons, Fig. 5, supply all the energy of chemical reactions (as when coal burns or TNT explodes). Evading all ordinary chemical action, the immensely greater energy bound up in the nucleus, Fig. 6, can be released only by direct hits on the nucleus to break the bonds that hold the protons and neutrons in a tight bundle.

RELEASES ENERGY

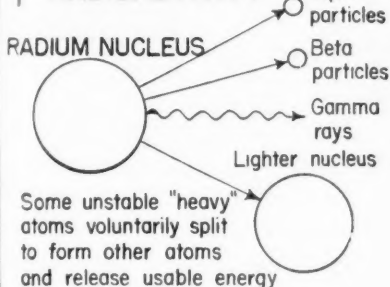
the fantastic course of atomic engineering through the five years of news blackout. It leaves no doubt that only a complete mobilization of America's technical resources could have won this victory in time.

Other writers in other places will unfold the epic story. This presentation leaves no space to reflect the glory of the accomplishment or even to record its history. The aim is more immediately practical

— to give the professional and business readers of the McGraw-Hill publications a sound and honest, though non-technical, understanding of this atom-smashing business, so that they will know better what to do about it in their personal and business lives.

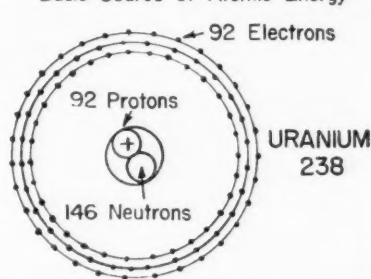
Now for step one: learning the shape of atoms and how atom splitting releases energy.

7 RADIOACTIVITY



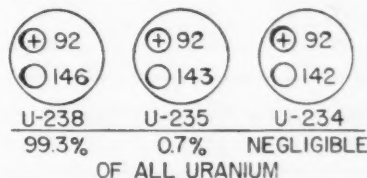
8 NATURE'S HEAVIEST ATOM

Basic Source of Atomic Energy



9 ISOTOPES

Chemically the same element and their nuclei contain the same number of protons. Only the number of neutrons differs. Thus the uranium isotopes are:



Radium nucleus, Fig. 7, automatically emits particles and energy as it decays to form nuclei of a lighter atom. Most common form of uranium, nature's heaviest atom, is Uranium 238, Fig. 8. This form is not directly useful for energy release, but is important as the raw material for a new synthetic power atom, *plutonium*.

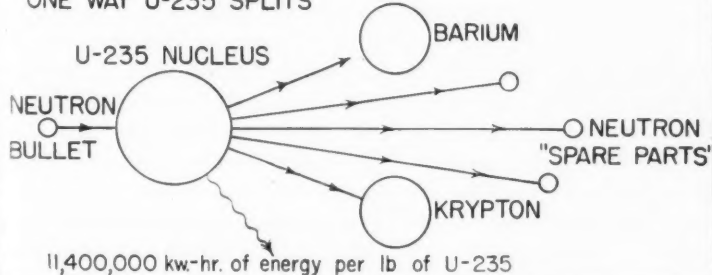
An element may have several *isotopes* — alternate forms with the same number of protons but slightly different

numbers of neutrons. Uranium 238 is the isotope in which protons and neutrons total 238 (so atom weight is 238). It is 99.3% of the total weight of pure, natural uranium. The stuff needed for direct atomic-energy release is Uranium 235, only 0.7% of the total weight and very difficult to separate from 238. To put it another way, every pound of energy-giving U-235 comes mixed with a dead load of 140 pounds of relatively inert U-238.

10 ENERGY RELEASED 11,400,000 kilowatt-hours per pound of U-235

When nucleus of U-235 atom is hit by neutron bullet it explodes to form lighter atoms and spare neutrons whose combined mass is less than mass of U-235. Lost mass is transformed into energy—see Einstein's Law

ONE WAY U-235 SPLITS



EINSTEIN'S LAW:

One pound of anything = 11,400,000,000 kw-hr.

when mass or energy converts to energy or mass

Applying this law to U-235 split:

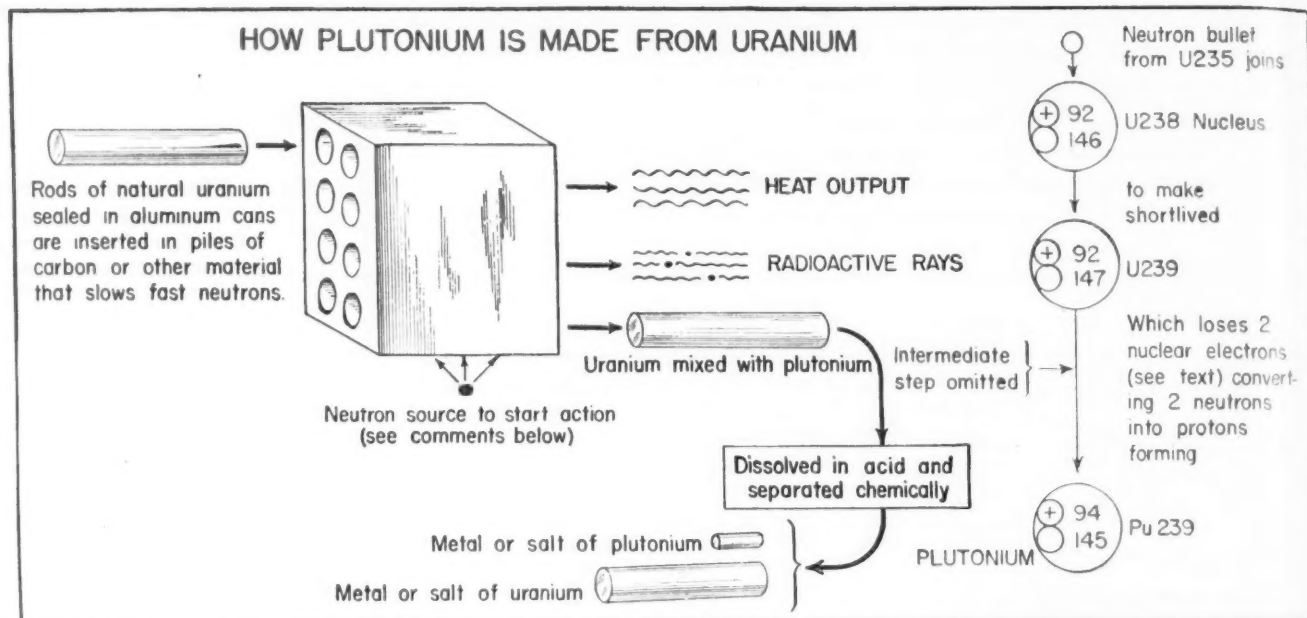
Explosion products of one pound of U-235 weigh 0.9990 lb., so 0.001 lb. of the mass is converted into $0.001 \times 11,400,000,000 = 11,400,000$ kilowatt-hours of energy.

Slow neutron bullet splits Uranium 235 nuclear target, generating two lighter atoms (Fig. 10 shows one possibility) and several free neutrons ready to split other U-235 atoms. The following pages show how the original neutron may be

produced and directed and how a chain of self-propagating atomic explosions may sweep through a block of U-235 like a forest fire to release heat energy equivalent to 11,400,000 kilowatt-hours per pound. CONTINUED ON NEXT PAGE

CREATING and ISOLATING

Man-Made Plutonium—U-235 Substitute



We now have two kinds of atoms suitable for energy supply, Uranium 235 and the new man-made element No. 94, plutonium. Uranium, No. 92, has the heaviest atom of any natural element.

The Manhattan Project's plant, on the Columbia River at Hanford, Washington, is the world's greatest atom-making factory. Devoted entirely to the mass production of plutonium atoms, it uses U-238 as the raw material and U-235 as the energy source, intimately mixed in the same proportions as in natural uranium metal.

The production units at Hanford are several huge uranium "piles." Each is a very large block of graphite with holes in which are placed uranium-metal cylinders, sealed in aluminum cans to protect the uranium from corrosion by the cooling water constantly pumped through the pile.

Each pile runs itself, so to speak. Not even the conventionally pictured bits of radium, beryllium and paraffin are needed as a "pilot light" to start operation. There are always enough stray neutrons, or even cosmic rays, to start a chain reaction.

But once started, the design, size and control of the unit must be such that the chain reaction will continue at an even rate—neither die down nor overshoot into an explosion.

To see this picture in atomic terms, consider the fraction of a second in which one million U-235 nuclei are split, producing two million lighter atoms (say, one million of barium and one million of krypton) and between one and three million fast-moving neutron projectiles.

Some of these escape in free flight right through the relatively vast atomic "open spaces." Some are "captured" by the many U-238 nuclei, and others are captured by the impurities. But, on the average, of the one to three million, just one million neutrons must succeed in smashing another million U-235 atoms in the next fraction of a second. Thus, with reproduction rate exactly maintained, life goes on in the atomic-energy pile.

The carbon, one of several possible "moderators," serves to slow down the neutrons without capturing many. The chance of a fast, straight-moving neutron hitting a tiny nucleus is very small, whereas the "slow ball" neutron is likely to be sucked in by the nuclear attraction if it would otherwise be a near miss.

From the practical angle, maintaining a chain reaction requires careful design and good controls. The pile must be slightly larger than actually necessary for a chain reaction (that

means scores of tons of material). Controls must be sensitive and dependable. They slow the pile down to the balancing point by sliding in retarders, such as strips of cadmium.

As already noted elsewhere, the energy released is about 11,400,000 kilowatt-hours for each pound of U-235 split. This energy appears first in the high speed of the pieces thrown off by the atomic split, then is converted to sensible heat as collisions slow down these projectiles. The energy is finally removed from the pile in the form of hot air, steam, hot water or other heated fluid in commercial quantity and thermal condition.

Such piles, operated with normal uranium, or with uranium enriched in U-235, would seem to be the primary means by which atomic energy will serve (if ever) as a commercial source of heat and power. Plutonium would be a byproduct, but might under certain conditions add to the energy yield of the pile without the need to separate it from the uranium.

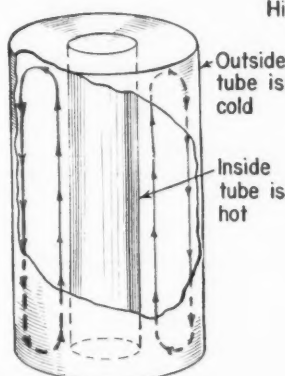
The use of normal uranium in the Hanford pile sounds extremely attractive as a heat source, but has certain economic disabilities. Only a small part of the U-235 is used up before the pile must be shut down to remove the plutonium.

G THE HIGH-POWER ATOMS

Isolating U-235 — a Gigantic Task

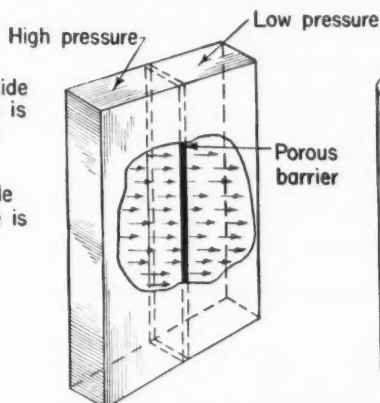
FOUR WAYS TO SEPARATE U235 FROM U238

1 Thermal Diffusion Method



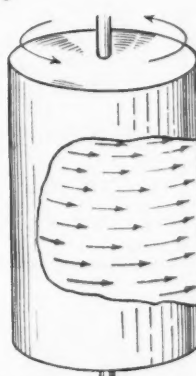
Fluid uranium circulates, tends to concentrate lighter U235 at top.

2 Gaseous Diffusion Through Barriers



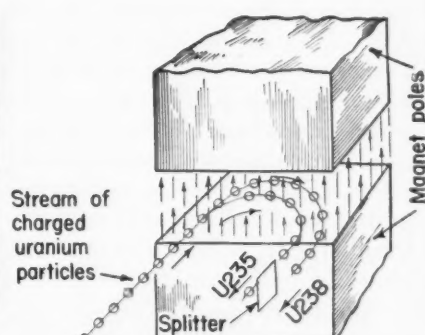
Lighter U235 gas passes more readily through barrier.

3 Centrifugal



When mixture of gasified U235 and U238 is spun rapidly, lighter U235 tends toward center.

4 Electro-Magnetic



In strong field of giant magnet lighter U235 particles are deflected more than U238. Half way round, splitter separates two streams.

Many of the uranium ores, including most samples of pitchblende and carnotite, will yield from 1 to 15% metallic uranium. Chemical separation of the metallic "natural" uranium is simple. Whatever the source, natural uranium contains the three isotopes in the constant proportions of 99.3% U-238 and 0.7% U-235, with traces of U-234.

Separating the U-235 from U-238, an operation essential for explosive uses of U-235, and probably important for future commercial controlled-chain piles, has been most difficult. Chemical separation was impossible because U-235 and U-238 are chemically the same.

The only possibility was a separa-

tion by physical differences, primarily a one percent difference in weight. The porous barrier and centrifugal methods pictured above required vaporizing a salt of uranium. All the methods shown have been used or tried on the Manhattan Project. All require many stages to achieve a substantial concentration of Uranium 235.

Dollarwise Thoughts on Atomic Energy

Costs mean little in war, but peacetime uses of U-235 and plutonium must pass the dollar test in competition with coal, fuel oil, natural gas, gasoline and electricity.

On the basis of energy costs only, "all other things being equal," the table on the last page of this section shows at what price per pound U-235 would give the same energy cost as conventional energy sources selling at the indicated prices. For such comparisons it is convenient to remember that one pound of U-235 is equal (energy-wise) to about 11,400,000 kilowatt-hours, also to 1500 tons of coal, or 200,000 gallons of gasoline.

Fuel engineers understand the limitations of such oversimplified comparisons. Others should be warned that "all other things" are never equal.

With this thought in mind, reconsider the uranium piles operated at Hanford to produce plutonium. These use U-235 in the cheapest form, say about \$1400 per lb., assuming purified normal uranium at \$10 per lb. (140 lb. of uranium contains one pound of U-235.)

If this were the whole story, coal would have to sell for a dollar a ton to break even with U-235 as a water heater. However, the pile using normal uranium must be immense to hold its own in a chain reaction. More important, the accumulating fission products "poison" the reaction after only a small part of the U-235 has been used up. Then the uranium cylinders must be removed for plutonium recovery. Finally, it has not yet been found possible to operate the normal-uranium

piles at high enough temperatures for practical power production.

If we go to the other extreme and build a small pile, using concentrated U-235, we shall run into excessive material costs, perhaps several times the \$52,000 per lb. set down in the table as the equivalent of 20-cent gasoline.

Something between the two extremes is likely to prove the most economical — perhaps a pile operating on a U-235 concentration between 1 and 10%.

The engineer of the "atomic-power age" must know the price of Uranium 235 in various concentrations and the characteristics of piles suited to them. No such information is yet available. He must also watch the danger from radio-activity; the requirements for radiation shields; explosion hazards, etc.

CONTINUED ON NEXT PAGE

WHAT TO EXPECT

Before discussion of possible and probable future applications of atomic energy to the arts of peace, the atomic bombs should have consideration. We may assume that these bombs contained from two to 200 lb. of either U-235 or plutonium, or both. No more precise information is available.

Details of the bomb design have been completely suppressed, but the following basic considerations are stated or implied in the Smyth Report:

The explosive in a bomb must be highly concentrated U-235 or plutonium. Since slow neutrons could not produce a satisfactory explosion, the neutron retarder or *moderator*, is minimized. This, in turn, requires a U-235 mass so large that the escape of neutrons without hitting nuclei will not be excessive. For every 1000 atoms hit, the neutrons produced must split more than 1000 new atoms, so that the reaction will proceed rapidly in an expanding chain, as sketched below.

There can be little leeway in the size of the explosive charge. For a given shape there is a certain "critical" weight of material. If this is exceeded the bomb explodes instantly. If the weight of charge is less than the critical, it cannot be made to explode.

Therefore, the critical mass must be created at the moment of explosion.

The Smyth Report suggests that this can be accomplished by breaking down the charge into two or more well-separated parts, each having less than the

CLAIMS LIKE THESE ARE NOT JUSTIFIED

1. Pretty soon no more coal will be mined except as a raw material for chemical manufacture.
2. In a few years a tiny bit of uranium, built in at the factory, will drive your car for life through an engine no bigger than your fist.
3. All the big central stations will soon be running on atomic power.
4. Cheap atomic energy will enormously reduce the price of power.

critical mass. At the appointed moment these could be brought together within the bomb to create a supercritical mass, which would then explode automatically.

Peacetime Applications

Except possibly for superblasting operations, uncontrolled explosive reactions cannot be permitted in the peacetime use of atomic energy. This means that the quantity of U-235 assembled in any one spot must always be kept well below the critical weight to avoid spontaneous explosion.

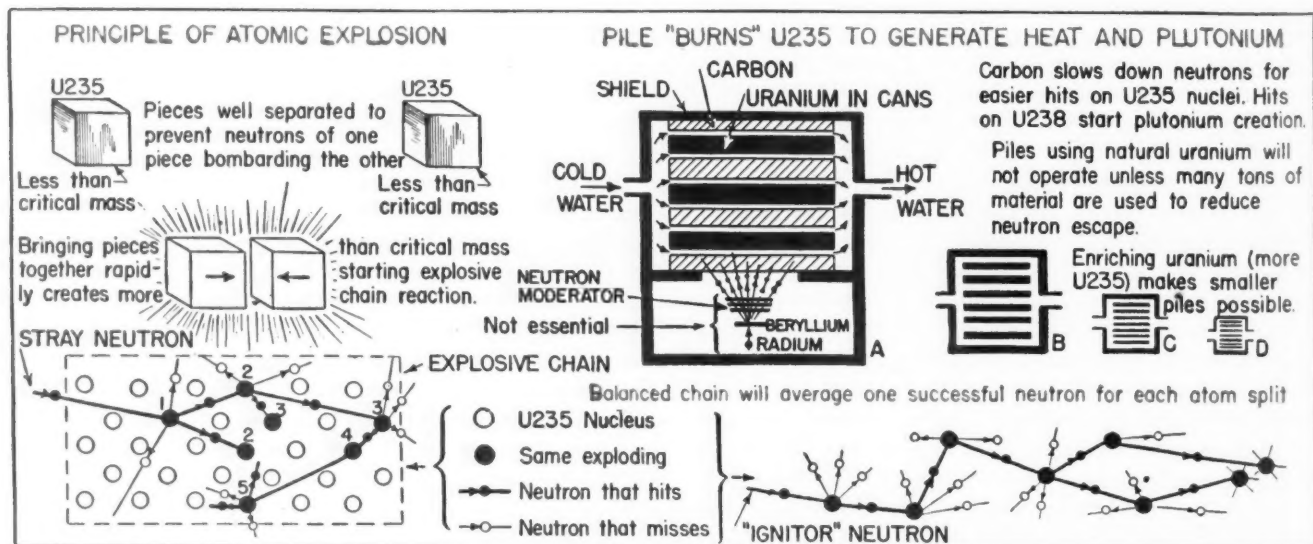
Depending on the particular application, the most desirable concentration of U-235 may range anywhere from the 0.7% in normal uranium up to 100%, with the probability that

many industrial applications will find the greatest economy in concentrations between 1% and 15%.

This matter of the degree of concentration of U-235 has received little public attention, yet nothing could be of greater practical importance. To make this point clear, consider the two extremes, 0.7% of U-235 and 100% of U-235, respectively.

The Hanford pile, using normal uranium (0.7% U-235) with carbon moderator, must be very large to work at all. It is inefficient in the sense that it must be shut down after a small part of the U-235 has been consumed. It cannot operate at high temperatures.

Its great advantage as a heat producer is the fact that its U-235 is bought at the lowest possible price. If



FROM ATOMIC ENERGY

...BUT REMEMBER THESE FACTS

1. The large-scale, controlled release of heat energy from U-235 has been fully demonstrated.
2. Beyond question, this energy could be applied directly for heating water and air, and making steam.
3. Such heat, in turn, could be applied directly, or converted into mechanical power or electricity by conventional steam turbines and gas turbines.
4. If and when U-235 in concentrations up to 10% costs less than \$25,000 per lb., it may find applications, but will compete, at first, with premium fuels rather than coal.

purified normal uranium sells for, say, \$10.00 per lb., the price of 140 lb. (containing one lb. of U-235) will be only \$1400. This would be a very favorable price if the pile could operate efficiently with the 0.7% U-235.

Concentrating the U-235 to 100% would permit a much more compact and convenient pile — perhaps little more than small pieces of U-235, encased in aluminum to ward off corrosion, and immersed in a tank of water; this should convert the water into steam at a regulated rate.

In large part, the control would be inherent. The water as a moderator would keep the chain going, but if the reaction got too violent, the resulting higher superheating of the steam would decrease the moderator effect and thereby hold the reaction in check. Yet even if all this comes true the cost of concentrated U-235 in the near future will be many times \$10,000 per lb.

Running up the concentration only a few percent above that in normal uranium may prove to be the way to get reasonable pile size and good efficiency without incurring exorbitant concentration costs.

When atomic energy is applied, the starting point is heat, picked up by water, air or a special heat-transfer fluid. Intermediate heat transfer fluids may be essential in certain applications (space heating and service water, for example) where people must be protected from injury by radioactivity.

The intermediate heat-transfer fluid

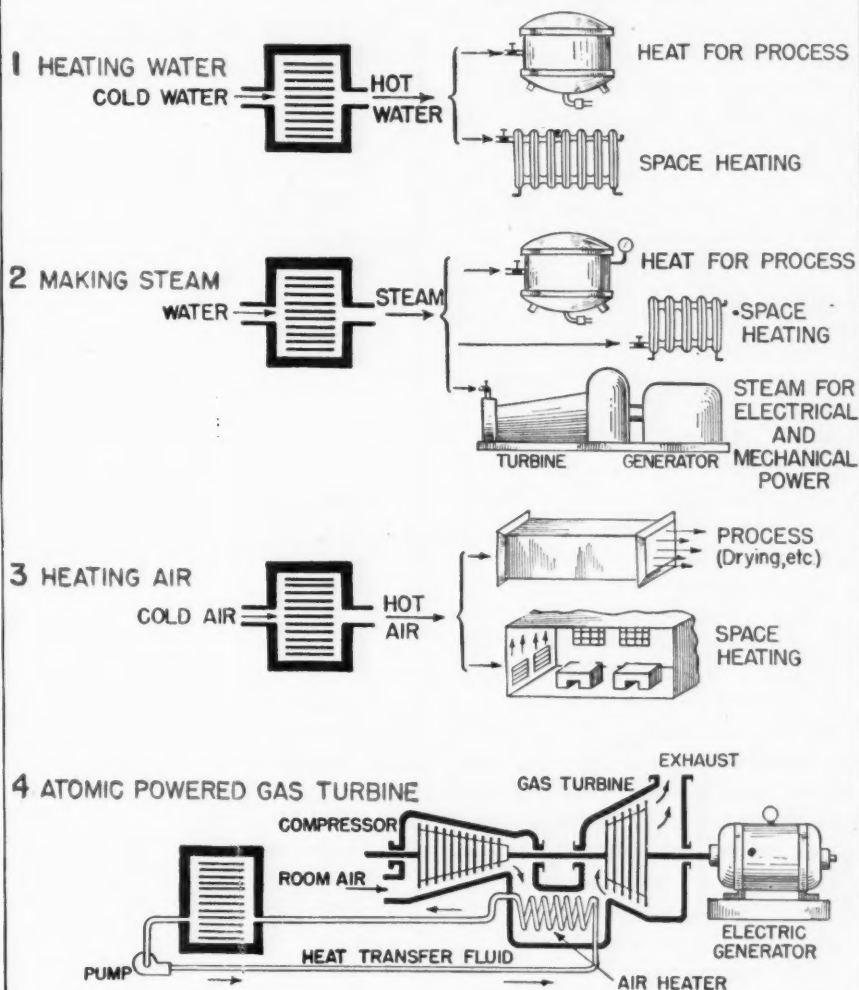
shown for the gas turbine would, of course, have to operate at temperatures up to 1200 F. There seems to be no basic reason why the pile itself could not be built inside the compressed-air receiver, discharging its heat directly to the compressed air.

With rather high concentration of U-235, this arrangement might be suitable for large airplane drive if excessive weight of radiation shields could be avoided.

Also, presumably, rockets and planes of the "buzzbomb" type could be powered by atomic heat delivered to the air of the jet steadily, not in puffs.

The sketches stress direct applica-

HOW ATOMIC ENERGY COULD BE APPLIED



Direct or indirect (as here) delivery of atomic pile's heat to air heater at temperature above 1000F could operate gas turbine.

THESE THINGS MIGHT RESTRICT USE OF ATOMIC ENERGY

1. Ineffectiveness of large piles using normal U-235 concentration
2. High cost of concentrated U-235 for smaller, more effective piles
3. Danger from radioactivity
4. Weight and cost of shielding against radiation
5. Explosion hazard
6. Possible short supply of uranium
7. Governmental restrictions on atomic-energy materials

tions of hot air, steam and hot water to process and space heating. This emphasis is justified by the often overlooked fact that such applications of heat have many times the total energy value of all the electricity generated in the United States for all purposes.

There has been much popular speculation regarding the type of engines required for atomic-power generation. The answer is simple. Present engines, steam turbines and gas turbines can be used with little or no change. This, of course, does not rule out the possible discovery of specialized engines for atomic power, or even direct production of electricity from atomic energy.

In the long run the implications of atomic power are staggering for both war and peace. However, popular writers on the subject have undoubtedly created unreasonable hopes in the minds of readers—for example, the expectation that in two or three years the Detroit builders will market cars with built-in "lifetime" slugs of U-235 and "fist-sized" engines.

Yet it seems fairly safe to predict that atomic energy will find some commercial applications within the next five or ten years, first, probably, as a premium fuel like aviation gasoline, worth a fancy price for specialized applications where low weight or some other characteristic is important.

As the cost of concentrating U-235 is reduced and application efficiencies improved, atomic energy may compete with cheaper fuels, perhaps ultimately with coal.

Important non-power applications of atomic energy may well include the ultra-high-temperature processing and fabricating of materials—also, modern "alchemy": building and rebuilding atoms to create new elements and to produce old elements at lower costs.

Radioactivity obtained directly or indirectly from artificial atom-splitting should find many important medical and industrial applications.

Turning back to ordinary power applications, we must avoid the temptation to overstress the economic importance of lower-cost power fuel. Fuel cost is only about 17% of the gross receipts of the electric utilities. Here's another way to put it: If, after allowing for transmission losses, one kilowatt-hour delivered to the consumer from modern plants represents a coal consumption of 1.5 lb., and if the coal costs \$5.00 per ton cancellation of the coal bill could not save more than $\frac{3}{8}$ of a cent per kilowatt-hour. And

atomic fuel will certainly not be free.

Performance of the atomic bomb is a monument to the scientists who unlocked the secrets of the atom and suggested the basic technique of making plutonium and concentrating U-235.

From there on, the job was at least 50% engineering. The various big plants of the Manhattan Project are vast assemblages of pipes, tanks, boilers, valves, instruments and controls, installed and operated by engineers, largely designed by engineers. From now on, the speed with which atomic power becomes practical will depend on the effectiveness of the engineer-scientist team.

It is possible, of course, that national controls may completely upset the entire technical and economic pattern of this discussion. For reasons of national security the government may decide to control or restrict atomic-power materials, plants and operations in ways not yet determined.

U-235 COULD COMPETE AT THESE PRICES other things being equal

Common fuel	Assumed prices	Comparable prices for Uranium 235, dollars per pound (nearest thousand)
COAL (13,000 B.t.u.)	\$6 per ton	\$9,000
	\$12 per ton	\$18,000
	\$15 per ton	\$23,000
FUEL OIL (150,000 B.t.u. gal.)	2¢ per gal.	\$5,000
	4¢ per gal.	\$10,000
	8¢ per gal.	\$20,000
CITY GAS (500 B.t.u.)	50¢ per 1000 cu. ft.	\$39,000
	\$1 per 1000 cu. ft.	\$78,000
NATURAL GAS (1000 B.t.u.)	25¢ per 1000 cu. ft.	\$10,000
	50¢ per 1000 cu. ft.	\$20,000
	\$1 per 1000 cu. ft.	\$40,000
GASOLINE (150,000 B.t.u. gal.)	10¢ per gal.	\$26,000
	20¢ per gal.	\$52,000
	30¢ per gal.	\$78,000

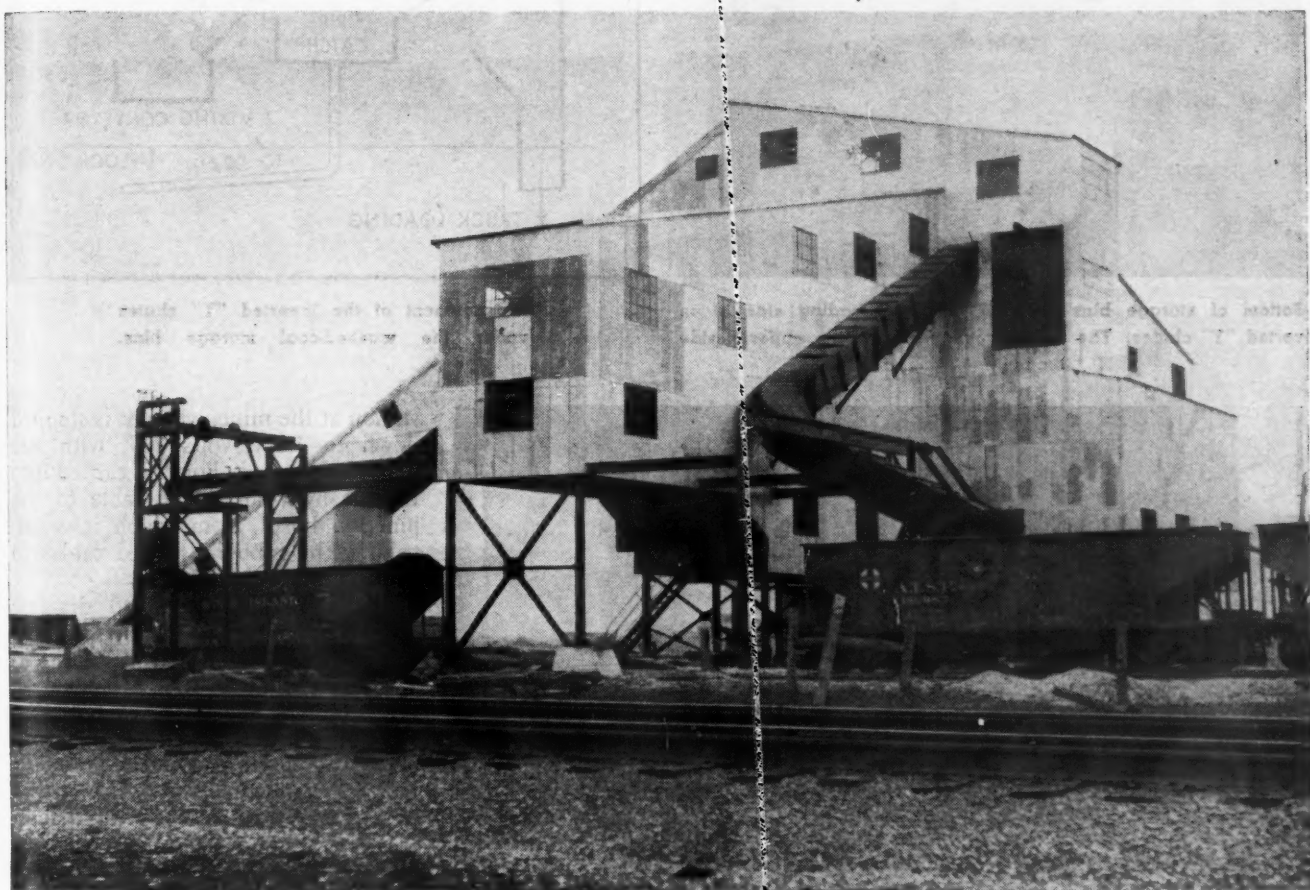
BUT

Note that "other things" are never equal. U-235 in normal uranium form is by far the cheapest, but involves use of excessively large and inefficient "piles." The unit cost of the U-235 in enriched mixtures increases with the degree of enrichment. Over-all cost comparisons can be made only for a specified concentration of U-235 and for apparatus suitable for that particular concentration. Possible explosion danger and need to protect personnel against radiation are other important considerations.

MODERN WASHERY

Supplements Stripping at New Truck Mine

Better Service to Truckers the Goal in New Northwestern Illinois Plant—Facilities Include Modern Washery, Centrifugal Dryer, Bins for Storage and Loading, Water Supply and Protection Against Cold



Equipped with washer, centrifugal dryer and storage and loading bins, this new Northwestern Illinois preparation plant is designed primarily to serve truckers.

By **FRED W. RICHART**
Assistant Editor, *Coal Age*

MODERN coal washeries designed primarily to serve the trucking trade seem likely to become more familiar sights in the future. The increasing volume of truck shipments and the insistent demand for clean, dustless coal are reasons for foreseeing a growing demand for small, modern washing plants. To keep their cost down, simplicity, convenience and sturdiness must be combined with means of as-

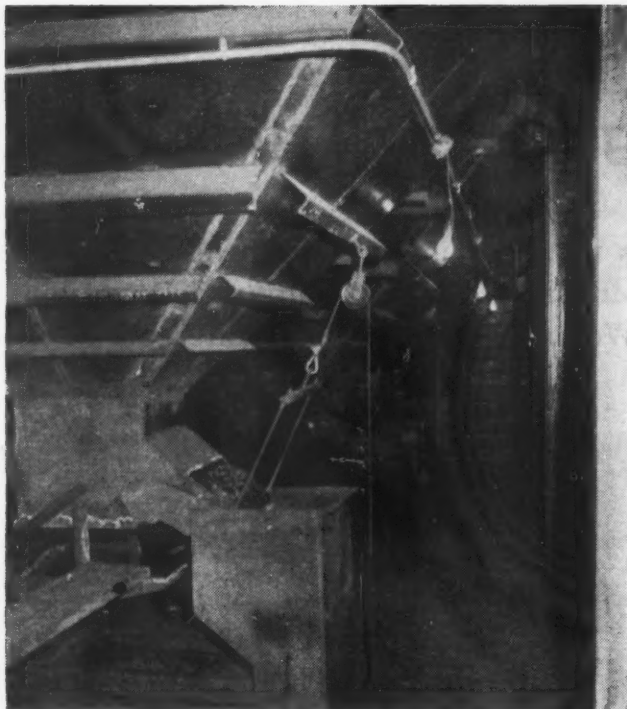
suming a supply of wash water and preventing the plant from freezing up in cold weather.

The Northwestern Illinois Coal Corp., Morris, Ill., has recently put into operation a new McNelly-Pittsburg coal-washing plant designed to meet these and other considerations. Oversized lumps are crushed to 4 in. and all coal is washed in a single jig box without return of middlings for rewashing. Ample storage is provided, blending facilities are complete and truck or car loading is done quickly. The single railroad track and the blending conveyor provide a means of

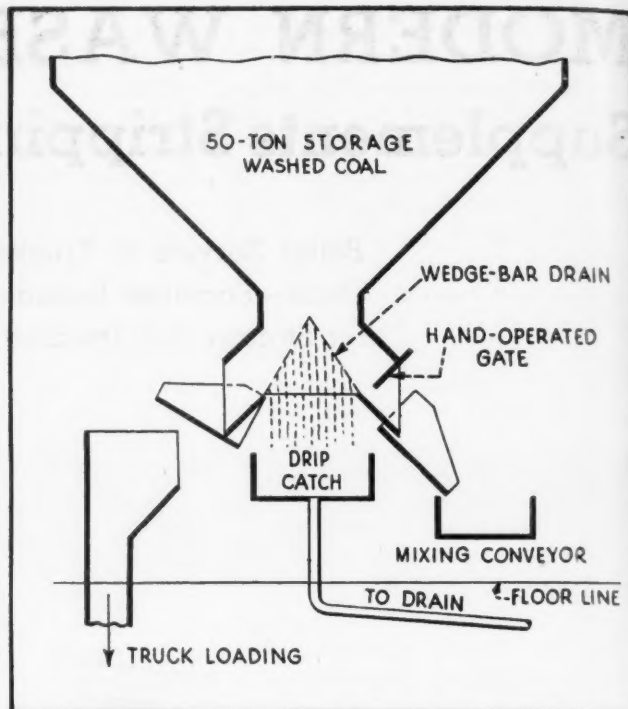
loading out all coal not sold to trucks.

This mine, within 50 miles of Chicago, is a strip operation recovering the No. 2 vein of Illinois coal averaging 30 in. in thickness. The soft overburden varies from 10 to 50 ft. in thickness and averages about 20. Stripping is done with a 6-cu.yd. dragline. The nearness to a city market, the high quality of coal and the ease of stripping offset, to a great extent, the economic hazards of mining a vein of coal this thin.

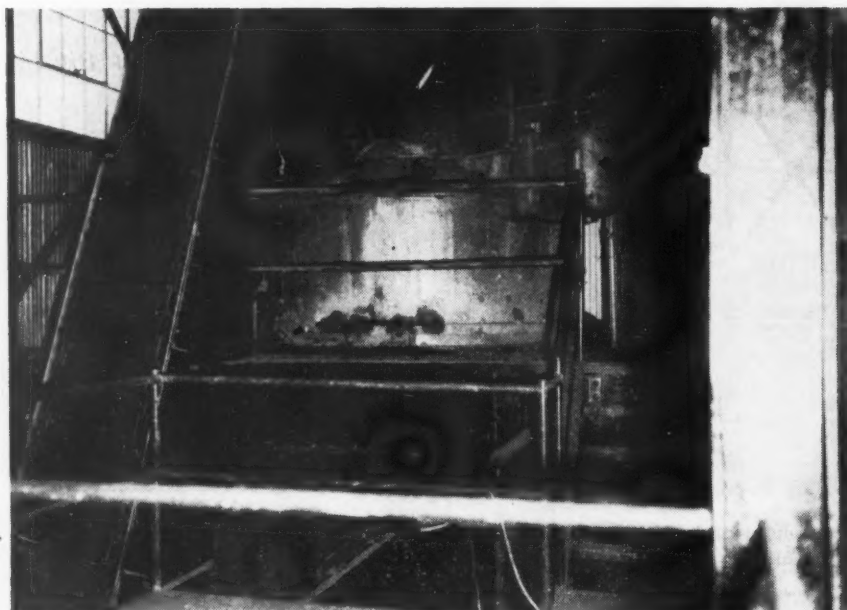
Electric power is supplied by the Public Service Co. of Northern Illinois over a 33,000-volt line to a sub-



Bottom of storage bins showing the truck-loading side of inverted "Y" chutes. The mixing conveyor is on the opposite side.



Arrangement of the inverted "Y" chutes under the washed-coal storage bins.



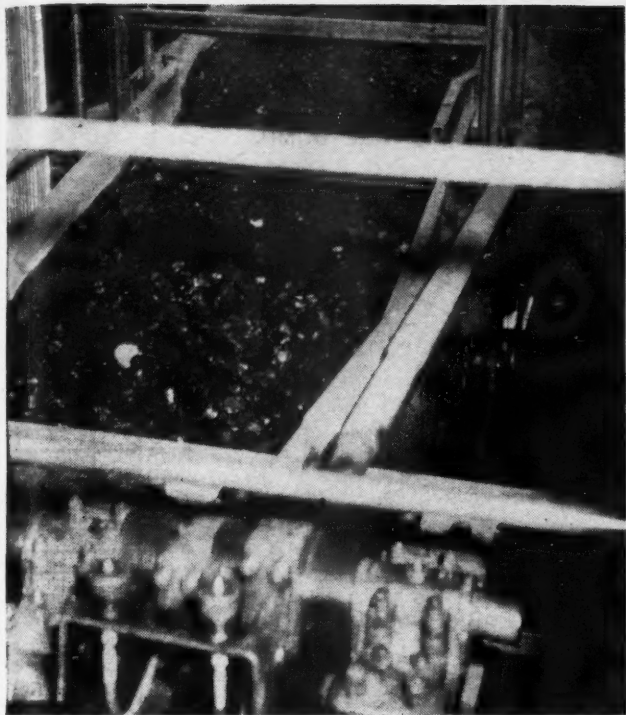
A centrifugal dryer dewateres $\frac{1}{4}$ x0-in. coal. The elevator at the left has a V-belt drive.

station at the mine, where it is stepped down to 4,160 volts "Y" with the neutral grounded. Power is carried into the pit by a submarine cable to the junction boxes, from which it is distributed by rubber-insulated cables to shovels, pumps and drills.

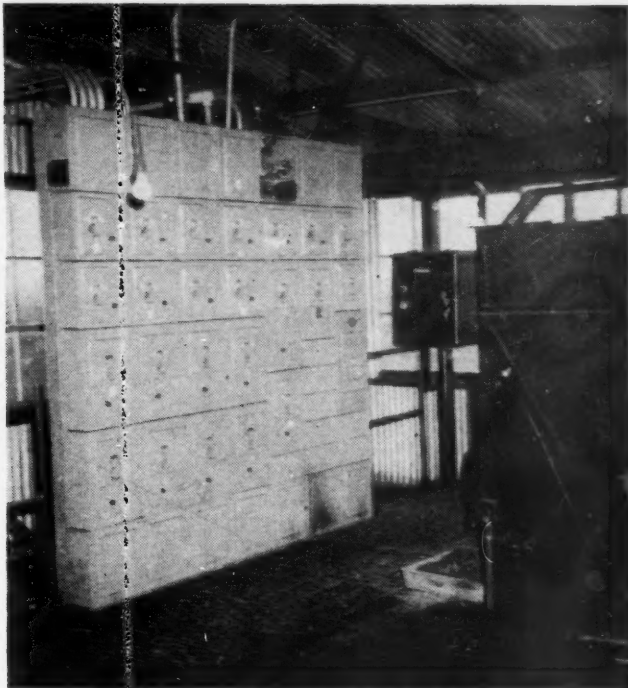
A 6-cu.yd. Marion 7200 dragline does the stripping. Coal is drilled with a Hardsocg auger drill for shooting with one-fourth stick of dynamite. For the present loading is handled by a small gas-driven shovel scheduled for



Strip pit and settling pond at Northwestern Illinois.



Classifying screen, which is lubricated by compression grease cups and hose.



Control panel for plant, using pushbutton-operated across-the-line starters. The square box beyond the panel is an inclosed circuit breaker controlling the entire system.

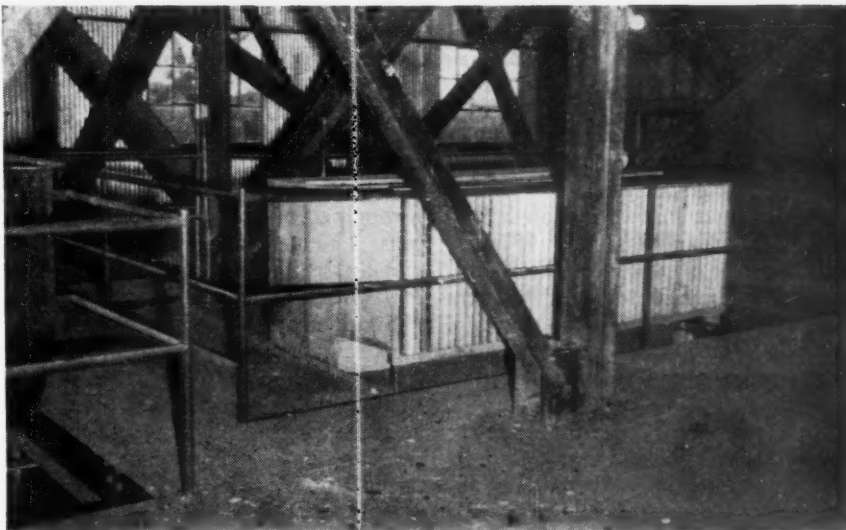
early replacement with an electric loader. The high wall does not require shooting. The trucks are Mack, driven by Cummins diesel engines, coupled to Austin-Western 30-ton semi-trailers.

The building equipment is limited to washery, garage and office. Heavy maintenance work on the shovels, trucks and the washer will be done at the shops of Northern Illinois Coal Corp., 20 miles away.

Pond Conserves Water

The water supply for the washery is conserved by discharging the overflow from the fine-coal tank, together with the effluent from the dryer, through an 80-ft. pipe into a pit reservoir, where the solids settle out. The clear water is returned to the sprays by a 2½-in. 250-g.p.m. pump. This is the make-up water. The water in the jig box is neutral from the effect of clay in the pit and the agricultural limestone which is dumped into the reservoir.

The raw-coal hopper is made of steel and is suspended from the concrete walls which house it and also the feeder, the raw-coal conveyor boot and the spray-water pump. The reciprocating feeder for the raw coal is suspended from the hopper. The feeder plate is carried on anti-friction rollers, and the



Above: Mine office with the truck scale at the left and the track scale at the right. Below: Warm-air heating outlet. Adjustable baffles control the current.

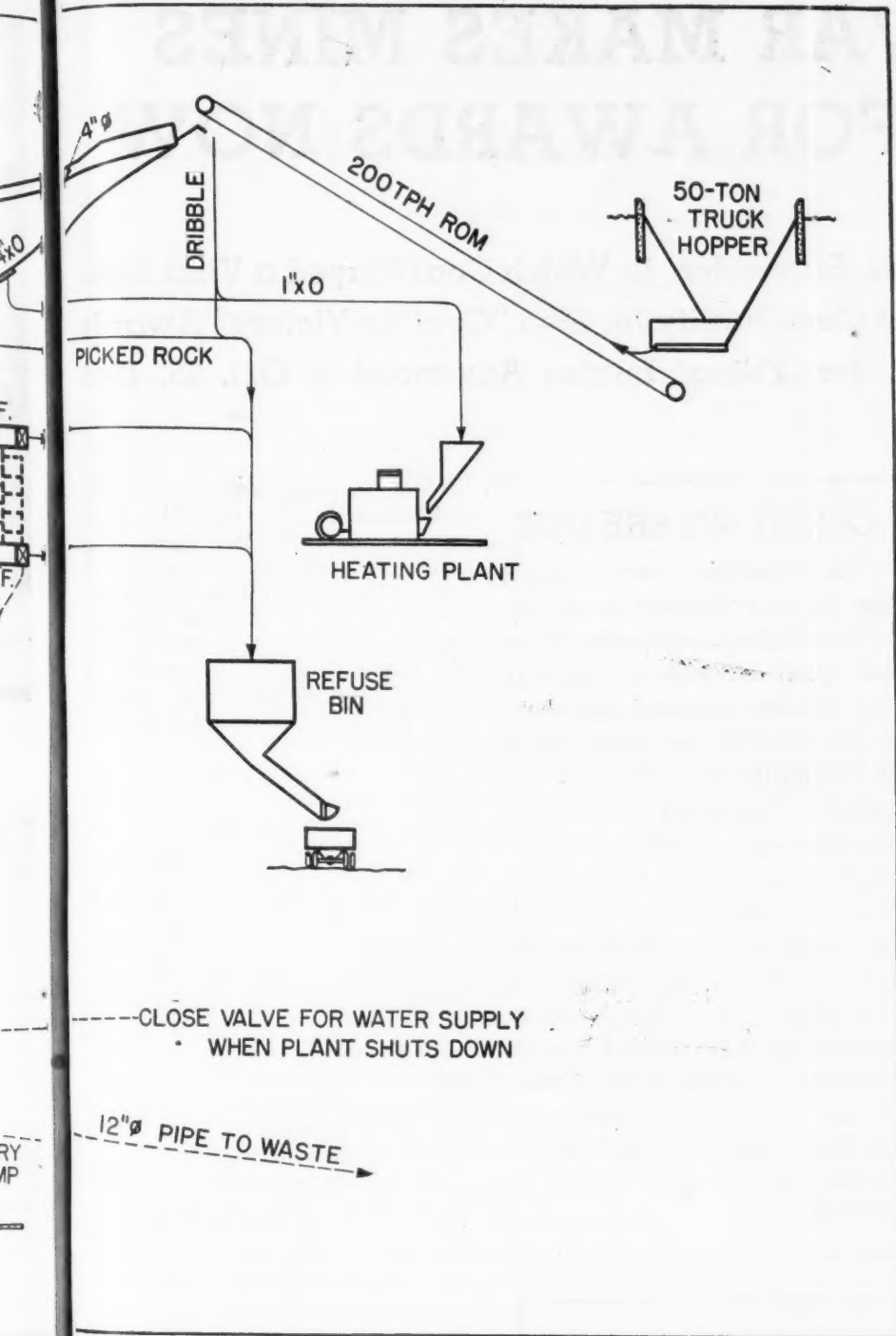


cranks are bored for three crankpin locations which provide three strokes for capacity adjustment.

The oversize coal falls into a 36x48-in. single-roll crusher from which it joins the 4x0-in. coal on the way to the jig box. However, it can be loaded

Simplicity of design is an outstanding characteristic of this plant. Aside from the refuse elevators in the jig box there is one elevator, three conveyors and one loading boom. All conveyor and elevator drives, except those of the jig box, are V-belt from motor to reducing-gear trains. The elevator feed-

The jig box is a McNally-Norton five-cell unit of the later type with an improved device for operating the refuse gates. The air control is simplified. The usual Ingersoll-Rand centrifugal compressor is employed. Refuse elevators are driven by small gear-motors with a chain drive from



veyor, which serves both trucks and rail cars.

The $\frac{1}{4}$ x0-in. coal is sluiced from the classifying screen to the fine-coal boot, which is a tank with the overflow recirculated to the jig box. The coal is elevated in buckets to a McNally-Carpenter centrifugal dryer. Dried coal is dropped directly into the storage bin under the dryer—so dry there is no seepage. The effluent passes over a wedge-wire screen carrying the oversize material into the coal boot and draining off the clay and extreme fines to the settling pond.

Bins Inclosed and Heated

One of the features of the plant is the complete inclosure of the coal-storage bins and the E. K. Campbell hot-air heating system which keeps them from freezing in winter weather. Equipment includes a Campbell furnace, Winkler stoker, Minneapolis-Honeywell automatic-control motor-driven fan and the necessary ducts and deflectors to direct the heat where needed. The building is tight. The hot air is directed along the bottoms of the bins, rises to the top of the building and returns past the slate pickers, jig box and dryer to the fan intake. Heat reaches all parts of the plant, keeping the temperature comfortable and making manipulation of the equipment easy and certain.

Clear water for sprays, which is the make-up water, comes from the settling pond through a centrifugal pump located in the pit beneath the raw-coal hopper. Water runs to the pump by gravity and neither suction pipe nor pump can freeze in the coldest weather.

Equipment in the plant is operated by 20 General Electric 440-volt splash-proof squirrel-cage linestart motors. All motors not directly connected to pumps or gear reducers have V-belt drives. The starters are Trumbull with remote pushbutton control from a central point. The control board provides for the manipulation of the entire plant. A circuit breaker near the jig box controls the main power circuit and cuts off all power instantly.

Lighting is from an independent transformer which provides light when the motor power is off. Standard lighting bulbs are the source.

The nearby office is equipped with a Fairbanks springless printing scale having a 34-ft. truck platform, the necessary business machines and "Warm Morning" heat. A fireproof vault protects all mine records.

T. C. Mullins is president of the Northwestern Illinois Coal Corp. L. H. Cunningham is superintendent and Tom Green is washery foreman.

the slow-speed shaft to the elevator head shaft. The rated capacity is 150 tons per hour, but may be upped to 200 tons if necessary.

Washed coal is sluiced to the 4x30-ft. two-section 150-r.p.m. classifying screen, the upper section being double-decked. The upper deck has 12 ft. of 1-in. perforations and the lower deck 12 ft. of $\frac{1}{4}$ -in. perforations in stainless-steel plate. This plate is stepped every 12 in. to promote dewatering of the $1\frac{1}{4}$ -in. coal. The lower section has 9 ft. of 2-in. perforations. Resulting coal sizes are $\frac{1}{4}$ x0, $1\frac{1}{4}$, 2x1 and 4x2 in.

The three larger sizes drop directly into three 50-ton bins and the small size is sluiced to the fine-coal boot. The 4x2- and 2x1-in. bins have spiral chutes to bin the coal without breakage.

Each of these three bins is equipped with an inverted "Y" discharge chute (see accompanying illustration). One side loads directly into trucks, the other into the mixing conveyor. Each "Y" has a wedge-wire drip with a connection to the sewer to drain off water seeping out of the coal. Hand-operated gates control the flow of coal from individual bins into the mixing con-

END OF WAR MAKES MINES ELIGIBLE FOR AWARDS NOW

With the Japanese Surrender, in Which Coal Played a Vital Role, Mines or Collieries Can Qualify for 1945 "Coal-for-Victory" Awards Now — Deadline for Filing Entries Advanced to Oct. 25, 1945

COAL AGE has terminated the 1945 "Coal-for-Victory" competition and will make awards on the basis of results up to the date of the Japanese surrender. Mines or collieries that have been able to equal the tonnage mined in the same period in 1944 or have raised efficiency 5 percent or more over that achieved in the same months last year will be eligible for the "1945 Victory Production Award," the "1945 War-Production-Efficiency Award" or both if they otherwise qualify.

Official entry blanks will be mailed to the heads of all companies operating serialized mines for which Coal Age has record as soon as they can be prepared—probably by or before this notice appears in the magazine. Companies not in the available lists or which for other reasons do not receive blanks will be supplied immediately upon request. With these entry blanks will go revised rules and regulations and other information on filling out and returning entries. Entry blanks, completely filled out, must be returned to Coal Age not later than Oct. 25, 1945.

Sharing in the nation's determination to spare no effort in bringing a quick victory, the coal industry was mining unprecedented tonnages, considering the handicaps under which it was operating, in the months preceding the Jap surrender offer. Now, it is heavily engaged in what still is the formidable task of producing fuel for winding up the war, meeting relief needs, rebuilding stockpiles and continuing essential services while other industry is reconverting and getting ready for the record activity now forecast. While it still has a big job, the war on which the "Coal-for-Victory" awards were based is over. Therefore, Coal Age's decision to terminate the awards as of the end of Jap resistance.

In announcing termination of the competition, Coal Age is happy to take this further opportunity of commending management and men for an out-

CREDIT WHERE DUE

The "Coal-for-Victory" awards are the only tangible recognition of outstanding contribution to the war effort available to coal mining. Management and men share in the credit for real achievement in fueling the war effort and laying the groundwork for progress in peace. The "Coal for-Victory" awards are designed to single out war contributions of an outstanding nature and provide inspiration for even greater accomplishment in the future. Coal Age wants to see that all those entitled to such recognition receive it. Coal companies can help by checking to see that every operation that can qualify for a 1945 award is entered.



For Outstanding Contribution to the War Effort—For winning mines or collieries who desire them, Coal Age makes these emblems available for presentation to employees. They will come in three colors—red, white and blue.

standing war contribution made under difficulties. In this, the Solid Fuels Administration for War joins. The coming of peace, however, in no way lessens the need for more efficient operation, and to recognize outstanding accomplishments in this field in the future Coal Age is announcing annual "Mining Efficiency" awards. The details will be published early next year.

Revised rules and regulations governing the 1945 "Coal-for-Victory" awards are given elsewhere in this announcement. Principal changes are in the deadline for filing—now Oct. 25, 1945—and in the period covered. Mines or collieries may submit data and man-shifts for the period ended either Aug. 1 or Aug. 15, 1945, with comparable data for the period ended Aug. 1 or Aug. 15, 1944. As in the original announcement, awards will be made for tonnage equalling or exceeding output in the comparable period in 1944 or for increases of 5 percent or more in output per man-shift.

The industry authorities who judged the awards in 1944 have again been asked to serve in 1945 and will meet soon after the final date for filing entries. Consequently, the board so far consists of the following:

Dr. R. R. Sayers, director, U. S. Bureau of Mines, Washington, D. C.

R. Y. Williams, consulting engineer and member of the executive committee, Production Control Plan for the Anthracite Industry, Pottsville, Pa.

Edward Steidle, dean, School of Mineral Industries, Pennsylvania State College, State College, Pa.

Carl Scholz, consulting mining engineer, Charleston, W. Va.

Harold L. Walker, head, Department of Mining and Metallurgical Engineering, University of Illinois, Urbana, Ill., is now abroad but is expected to return by the time the judges meet, in which case it is hoped that he also can join with the others again.

FINAL RULES AND REGULATIONS

1945 "Coal-for-Victory" Awards

Changes are shown in *italic type*

1. Any mine or colliery in the United States that has a War Production Board serial number and was open for production *throughout the calendar year 1944 and throughout 1945 to Aug. 1 or Aug. 15* is eligible to compete for the "1945 War-Production-Efficiency Award" or the "1945 Victory-Production Award" or both.

2. The "1945 War-Production-Efficiency Award" will be presented to any serialized mine otherwise qualifying that increases its output per man-shift 5 percent or more in the period beginning Jan. 1 and ending Aug. 1, 1945, as compared to its output per man-shift in the period beginning Jan. 1 and ending Aug. 1, 1944. *If mines or collieries choose, they may submit instead data for the period Jan. 1-Aug. 15, 1945, and Jan. 1-Aug. 15, 1944.* This award is intended to recognize outstanding achievement in increasing efficiency by the methods normally employed and judging shall not be alone on the results but also on how they were achieved. Mines or collieries filing for the "1945 War-Production-Efficiency Award," therefore, shall supply a statement outlining how the increase in output per man-shift was attained and shall agree to supply, upon request, such additional information as may be required to permit a decision to be reached.

3. The "1945 Victory Production Award" will be presented any mine or colliery otherwise qualifying if its coal production *during the period beginning Jan. 1 and ending Aug. 1, 1945, was equal to or greater than its production in the period beginning Jan. 1 and ending Aug. 1, 1944.* *If mines or collieries choose, they may submit instead data for the period Jan. 1-Aug. 15, 1945, and Jan. 1-Aug. 15, 1944.*

4. More than one mine or colliery operated by any one company is eligible for and may receive either or both awards if they otherwise qualify. The winning of an award, or awards, by one mine or colliery operated by a specific company shall not prevent another mine or colliery operated by the same company from also winning one or both awards if it otherwise qualifies.

5. The awards to mines or collieries will consist of certificates attesting their contribution to the 1945 war effort by meeting or bettering the goals established. Individual certificates also will be awarded, upon request, to each member of the winning mine or colliery's supervisory staff attesting their contribution to the war effort as evidenced by an award to the mine or colliery. Should the operating company so decide, emblems for presentation to employees at winning mines or collieries will be made available by Coal Age.

6. Qualifications for the awards shall be judged on the basis of statements submitted by authorized officials of the companies operating the mines or collieries in question on official forms to be supplied by Coal Age. Statements must be completely filled out and must be filed on or before Oct. 25, 1945. Postmarks shall be the guide in judging acceptability under this restriction.

7. Coal Age reserves the right to request from appropriate government or other statistical agencies certification of production and other figures submitted by coal companies filing for an award or awards, and such companies shall agree that statements are submitted subject to such certification.

8. A board of judges nominated by Coal Age shall be the sole judges of the qualifications for awards and coal companies filing for the awards shall agree that their decision shall be final.

9. Realizing that changes arising out of the course of the war might materially alter conditions, Coal Age reserves the right, if in its judgment it should appear to be necessary, to modify the terms and conditions of the awards, adopt new terms and conditions to the extent necessary to permit giving proper recognition for meritorious work in supporting the war effort, or cancel the awards entirely.

10. Announcement of the awards will be made as soon as practicable after the final date for filing.



Sharp turns and stiff grades increase tire problems in this 400-ft.-deep strip pit.

HOW TO MAINTAIN Synthetic Tires and Tubes in Coal Mining

Proper Selection the Starting Point in Increasing Life of Synthetic Tires and Tubes—Load, Inflation, Road Condition, Driver Training and Repairing, Retreading and Mounting Also Important

By **L. H. TAYLOR**
Truck & Bus Tire Department
The B. F. Goodrich Co.
Akron, Ohio

THE CONTINUED SHORTAGE of tires, coupled with increased use of stripping and underground mechanical-mining equipment, makes it important that each mine operator be thoroughly

familiar with the care and maintenance of mine tires. The rubber industry has been building tires used in mine work with a combination of synthetic and natural rubber now for about a year. Before that time many tests were conducted so that considerable knowledge has been accumulated on the performance and the proper care and maintenance of these tires.

While off-the-road tires made of a combination of synthetic and natural

rubber do not give as long service as prewar natural rubber tires, they have delivered better service than was expected when the rubber industry was approaching the problem of building these tires a couple of years ago. To obtain the longest possible life from synthetic mine tires the same rules governing the care and maintenance of natural rubber tires should be followed. They must be followed more carefully, however, because there is not

as great a factor of safety and because many of the conditions which damaged natural rubber tires will cause even more damage to synthetic tires. In addition, there are a few specific problems in connection with present tires which did not apply to the prewar variety, or applied to a lesser degree.

Tires Designed for Job

While the development of special off-the-road tires is a relatively recent one—during the last ten to twelve years—industry produces tires of different types for specific jobs, and it is important that the proper tire be selected for the type of work to be done. For instance, certain types of tires are especially engineered to resist the cutting and abrasion growing out of rocky conditions in various types of strip mining as well as in underground mining. Some of these tires are built with a directional tread; that is, they are mounted so that the tread turns in a certain direction to obtain maximum traction. There are others with a non-directional tread which eliminates the problem of mounting directionally. Such tires must be constructed to absorb severe impacts without breaking the cord body of the tire. Reasonably good traction is required.

Other tires are made for traction wheels on vehicles used in sand, dirt and loam, where the maximum in traction and flotation is needed for operation. These tires are generally built with widely spaced directional bands or cleats so that the cleats may pene-



Where proper care paid dividends. This tire gave over 5,000 hours of service in three years without being off the wheel.

trate only deep enough to allow the tread surface to ride on the ground and provide a good bite for the lugs.

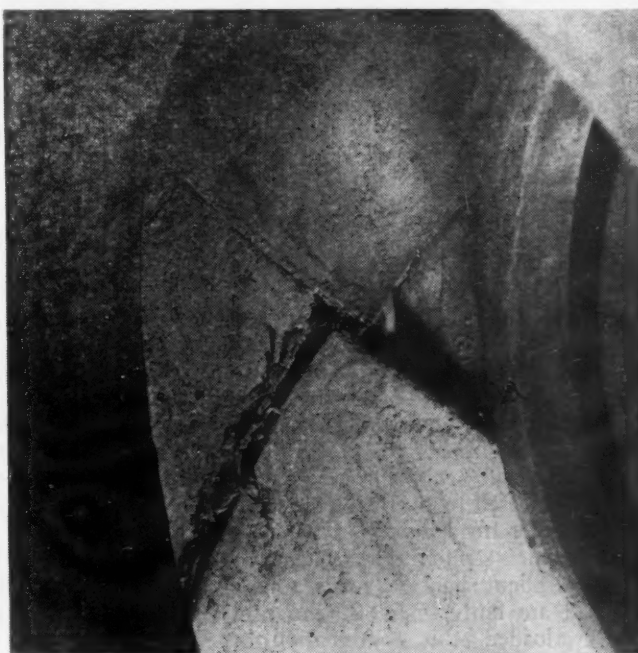
Another type of tire is needed where the equipment must go into the pit, where traction and protection against cutting and bruising are needed, and then pull out on a highway where long wear and cool running are necessary. This requires an off-the-road combination and there is a special tire for this type of operation.

In underground mining the tire needed is very similar to the first one mentioned, but it must have excellent protection in the shoulders and sidewalls against cutting and scaling. In some wet mines traction is quite important.

Your tire supplier should understand your operation thoroughly and should work with you in supplying the proper tire for the particular type of service encountered.



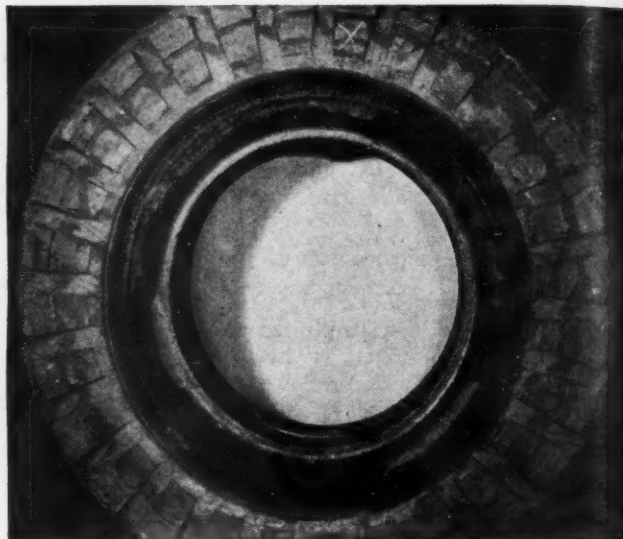
Roadbed and loading area should be kept clear of damaging material. Heavily loaded tires take a beating when run over sharp rocks, boulders and other obstacles.



This tire was completely ruined by striking a boulder. Overloaded and overinflated tires are more susceptible to this type of injury increasing losses and raising cost.



Underinflation causes sidewalls to bulge, results in severe flexing and increases heating and likelihood of snagging and cutting sidewalls in field service.



This tire was ruined by rubbing against a broken leaf spring. Similar damage occurs when rocks are caught between the tires when dual mounts are employed.

One would not consider wearing size 9 shoes if the proper size were 10½. Using too small a tire size won't hurt your feet, but it will hurt your pocketbook. So it is important, especially with synthetic tires, that the proper sized tire be used for the loads carried.

It has not been uncommon for operators of mine-haulage equipment to overlook or not consider the definite limitation of carrying capacity of the tires used. Sometimes a decision has been made to overload tires because it was felt that the additional tonnage hauled would result in increased earnings much more than offsetting the reduced tire service. While there may be some instances where this is true, the cost of delays caused by tire failures and injury to equipment other than tires often is overlooked in such computations.

Overloading Breaks Cord

Overloading tends to make tires flex severely in the sidewall, which may cause the cord body in that area to break down. An overloaded tire will strike an object with greater force, increasing the likelihood of the tire being cut or the cord body broken by the force of the impact. Also, the tire load per square inch of tread contact area is increased by overloading, resulting in faster tread wear.

In some strip-mining operations with excellent haulage roads speeds reached are fairly high. If the tires are overloaded, this combination of load and speed may cause overheating in the tire, with resulting separation and premature failure, especially with synthetic tires. Tires made with syn-

thetic rubber heat up faster than tires made with natural rubber and any condition which adds to the tire temperature is likely to be disastrous, especially with synthetic tires.

From the standpoint of saving rubber and tire expense, it will pay to check the axle loads on equipment when loaded and thus determine the proper loads to carry, so that the tire loads do not exceed the Tire & Rim Association recommendations. These recommendations also are followed by tire manufacturers in their official publications.

More probably has been published about the rules of tire inflation than any other factor in the care and maintenance, yet observation indicates that improper inflation is widespread.

Correct Inflation Vital

It is the air within the tube which holds the vehicle off the ground. The tire or casing simply serves as a protector for the tube. Tires are engineered to be operated only within certain minimum and maximum ranges of air pressure which are dependent on the type of surface over which the tires travel, load and speed. With the possible exception of airplane tires, there are none in use today where proper inflation is more important than in tires carrying heavy loads in mining service.

The tire is built with a sufficient number of plies to withstand the internal pressure recommended. If greater than the recommended pressure for the maximum load is used, a strain is put on the cord body of the tire. This takes part of the stretch out of the cords so that there is less

tensile strength left in them to resist impacts, thus making the tire more susceptible to cuts. An idea of the effect of air pressure in the tire is obtained by determining the total force in the tire through use of a mathematical formula. For instance, in a 11.00-20 tire with an air pressure of 70 lb. per square inch, the total force in the tire is 217,800 lb. If the air pressure per square inch in this tire is increased to 80 lb., the total force goes up to 248,976 lb. "Air pressure is dynamite" and its improper use, as in overinflation, can result in damage just as bad as if dynamite had been used in the tire.

Too much air pressure, in addition to making the tire more liable to being ruptured by impact, also reduces traction and flotation by reducing the tread contact area on the ground. It puts rubber under tension and stretched rubber cuts more easily.

Underinflation has practically the same effect on tires as overloading. It causes them to flex severely, get hotter and break down in the sidewall or shoulder area. It causes scuffing of the shoulders of the tread, resulting in faster wear. An underinflated tire bulges excessively in the sidewall and increases the likelihood of the sidewall being cut and snagged.

Use Load and Air Tables

Use the proper load and inflation table set up by the Tire & Rim Association, dependent upon the type of road-bed, load carried and speed and inflate tire when cool every day, if possible, the equipment is operated. In any case tires should be checked and inflated at least two or three times a

week. This will often bring to attention tires which are severely under-inflated and which if continued in that condition might soon be ruined.

Replace worn valve cores and make sure that valve caps are on every valve. Caps, in addition to keeping dirt and moisture out of the valve, will serve as a double protection in preventing leakage of air.

Bleeding Is Bad

Never bleed tires; that is, never let out air pressure that has been built up after the tires are operating and became hot. Reducing this built-up air pressure does not lower the tire temperature. In fact, it will result in the tires becoming hotter when operation is resumed, and heat is one of the greatest enemies of rubber, particularly synthetic rubber. In addition, tires which are bled when hot will be underinflated when they cool off.

Better operated mines make sure that haulage roads are kept in good condition. The condition of the road

over which the vehicle travels has a great effect on the service to be expected from the tire. The more sharp curves there are in a haulage road and the more turns the haulage units have to make the faster the wear of the tires. In stripping operations especially a little foresight and planning can reduce such wear considerably by keeping the haulage roads as straight as possible and planning a large turning area around the shovel or loader.

On haulage roads a grader, bulldozer or some other method should be used to keep the roadbed clear of rocks and coal and keep holes and depressions filled. The resulting increase in the service life of the tire, especially with synthetic tires, which cut easier than natural rubber tires, usually will pay for the cost of this road maintenance.

It is especially important in strip pits, or in any mine where there is considerable water, that during wet weather the loading and dumping areas be kept as clear of tire-damaging material as possible. This is because rubber will cut about three or four times easier when wet.

One of the most damaging conditions found underground is around pillars and corners where the base extends out considerably from the rib. This causes many tires to be cut or snagged. In areas where shuttle cars are operated a little time spent in eliminating these extended bases, so that when the vehicle rubs against the rib of the pillar or corner the tires do not touch it, will save lots of delays and tire expense.

Driver Can Help

Regardless of all the good preventive maintenance practices set up, the service obtained from mine tires is greatly dependent upon the driver. The good driver will miss many obstacles that could cause tire damage. He will prevent the tires being scraped along the side of a bank or the ribs of a deep mine. Proper use of the brakes can help prevent rapid wear and in soft, wet going properly trained drivers will help prevent much of the wear and cutting caused by spinning the power-wheel tires. A little



These duals are properly matched. Tires on the power axle are mounted so that the point of the "V" strikes the ground first for best traction. Tires on trailing axle are reversed for longer wear.



Well-maintained haulage roads save tires and equipment.

time spent in training drivers so that they understand the ultimate results expected will pay big dividends.

It has always been important that tires that have been cut or snagged be removed from service promptly so they can be repaired. To permit them to continue in service often is likely to result in an injury being aggravated to the point where the tire is not repairable. This takes on added importance with tires made partially of synthetic rubber, since man-made rubber will cut more easily and the cuts have a tendency to grow faster than in the crude type.

Repairs Better Made

Progress has been made during the last few years in repairing tires used in a strip-mine and deep-mine service, and repairs now generally hold up better in these tough-going conditions than they did a few years ago. The war has taught us to save rubber, and in many instances that will help save money. This will be important in the competitive days to come when maintenance costs must be kept low.

Retreading either by a full shoulder-to-shoulder retread or by a top cap in which the tread wearing surface only is replaced has been practiced extensively during the war. It has helped keep many vehicles from being laid up for lack of tires.

Experience indicates that some operators do not believe recapping or retreading to be economical, whereas others have been very successful and

plan to continue this practice when there is a more abundant supply of tires. The main reason for the two different schools of thought is the care the tires receive during their original tread life and whether or not they were removed for retreading at the proper time.

The tire that is constantly overloaded and perhaps overinflated during its tread life, even though it delivers full service, is much more likely to have incipient failures in the cord body which cannot be detected on examination, with resultant early failure of the tire after it has been retreaded. A tire that has been operated in an underinflated condition may have almost reached the point of breaking down when it was recapped, and its past sins catch up with it after it has been retreaded and put back into service.

At one stripping operation where the tires are loaded to full capacity but not overloaded, are operated at proper pressure and proper attention is paid them, tires are retreaded as many as two and three times. In the same area similar tires operated without proper care and maintenance and overloaded can very seldom be given even one retread.

Because synthetic tubes and flaps do not slide into position when they have been mounted and inflated as readily as the natural rubber product, it is necessary to use the proper type of lubricant to permit them to go into position without undue stretch in one area. To accomplish this a solution of

vegetable-oil soap should be used. With a brush or cloth swab apply this solution to the bead and inside area adjacent to the bead in the tire, to both sides of the flap and to the rim side of the tube. Then when the tire, tube and flap are mounted on the rim and inflated, the tube and flap will not be stretched thin in the rim region and thus failure will be prevented which might otherwise occur.

Allocating Responsibility Pays

Many of the most successful mine operators have found that it pays dividends to have someone responsible for tire care and maintenance. Getting long trouble-free service from tires used in mine operations is mainly keeping everlastingly after the little things. On larger operations one man on this job will more than pay for himself in lower costs per mile or per hour of tire operation. In a smaller or medium-sized operation, this job usually can be handled by some individual who has other duties. The important thing is to have a system of maintenance supervision and to have someone directly responsible for it.

The pneumatic tire, during the war years, has carried its load and helped the coal industry to produce increased tonnage. With victory, pneumatic tires will continue to serve the coal industry and help in reducing costs as more and more tons are hauled on tires. Tire care and maintenance will be important even though plenty of rubber is available.

ANTHRACITE APPLICATIONS

For New Loading and Transporting Units

Raising Output per Man Underground Looming Larger as One of the Major Goals in Anthracite — Modern Equipment Offers New Possibilities in Steep- and Moderate-Pitch Mining as Well as Flat Work

INCREASED stripping, major strides in the recovery of bank coal and greater mechanization of loading underground have played a major role in keeping the price of anthracite down in recent years in spite of rising wage rates and other costs. How much farther stripping and bank work can be extended is a matter of speculation although there is some reason to believe that further substantial cost reductions in this direction are unlikely. Therefore, many authorities now see the remaining major avenues to greater efficiency and low cost as limited to two:

1. Greater output per man employed in hand loading underground.
2. Increased mechanical loading supplemented by better transportation.

Men and Machines the Factors

Raising output per man in hand loading, and in other underground and surface activities, offers real problems in overcoming the tendency of miners to limit their production, all-too-frequent public sympathy with their stand and precedents and decisions often limiting the cost-reducing possibilities of new methods and equipment. But while urging more strongly on the miner and the anthracite public the benefits of increased individual output, management also has an opportunity in the fullest possible exploration of the second method of raising efficiency—mechanization of loading and adoption of modern transportation equipment, starting with improved cars and locomotives, better track and better haulageways.

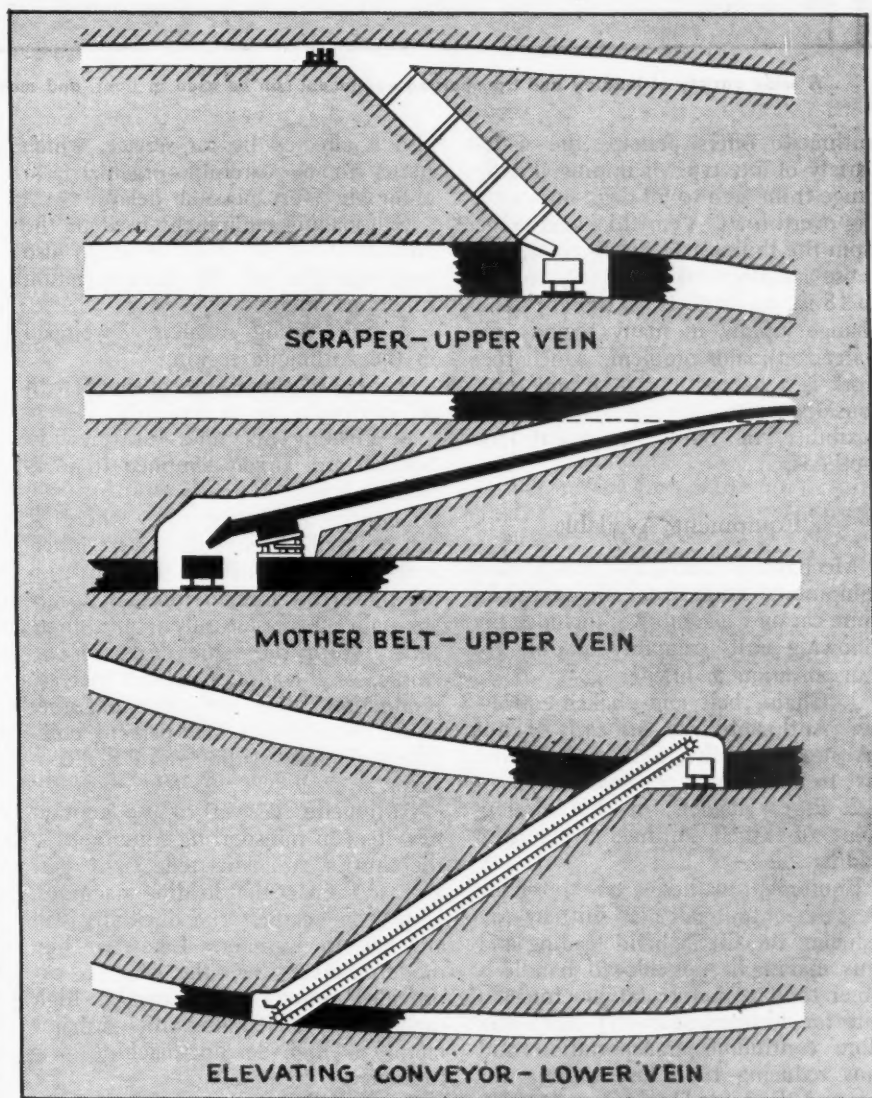
The first question might be: "What does such equipment offer?" The figures necessary for arriving at a hard-and-fast answer are not available, but it is possible, on the basis of published data, to arrive at an estimate. At the present time, average output per man employed in mechanical loading in the anthracite region apparently is running about $\frac{3}{4}$ ton per shift ahead of the average in hand loading.

Since mechanical-mining equipment

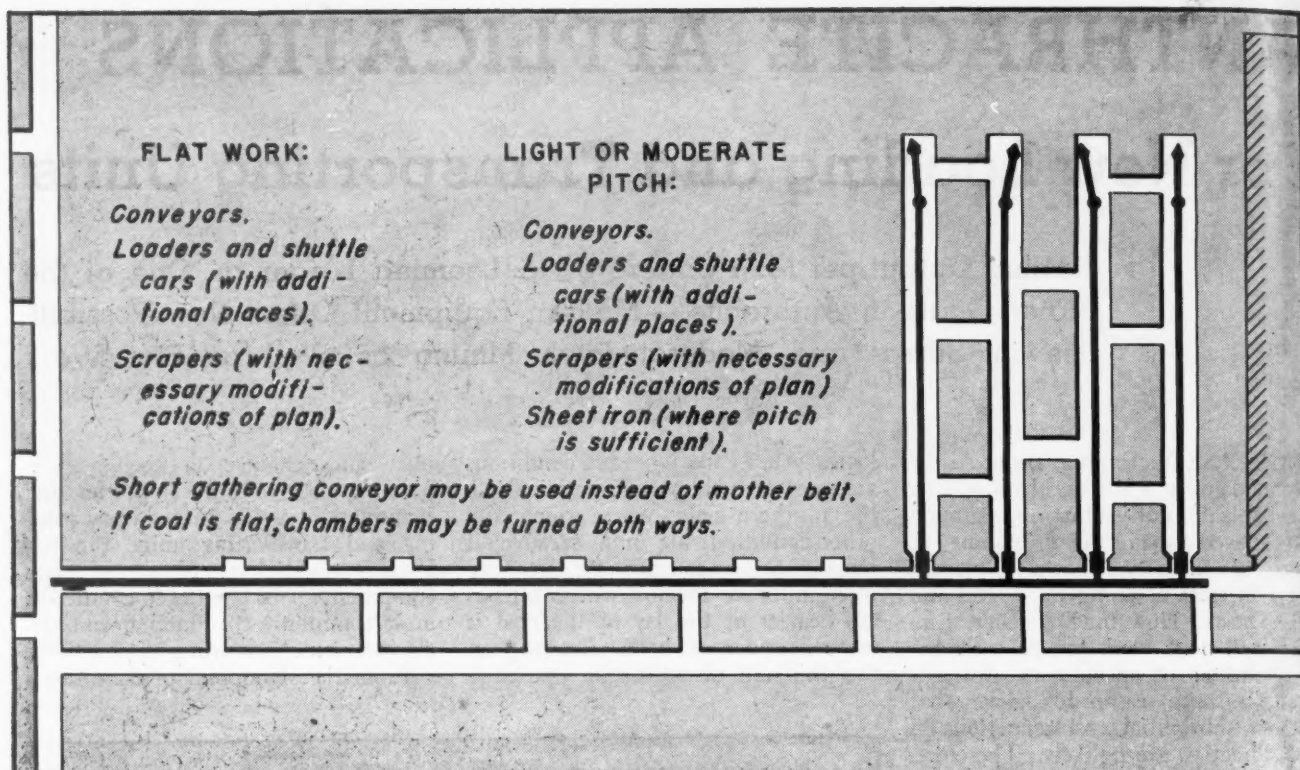
logically has gone in where conditions are most favorable, meaning largely in the northern field, where pitch and other conditions are more suitable, it remains to be seen how far it can be used in other regions where pitches are heavier or the lay of the coal is more irregular, or both. Drawing on the thinking of anthracite operating

men and engineers, experience in pitching coal in other localities and examination of the various new loading and transporting units, the following material attempts to relate equipment characteristics to conditions most commonly encountered and single out some promising applications.

From the standpoint of conditions,



Three methods of using scrapers, belts and elevating conveyors to work veins above and below the main vein.



A wide variety of loading and transporting equipment can be used in light- and moderate-pitch chamber-and-pillar mining.

anthracite offers perhaps the widest variety of any type of mining. Pitches range from zero to 90 deg., not counting overthrows. Vein thickness ranges from the thinnest to the thickest, with those actually worked varying from 16 to 18 in. up to 40 ft. or more. Pitches change rapidly in many regions and water is a major problem. Much rock work is a necessity. These and other considerations demand considerable flexibility in both equipment and methods.

Equipment Available

Mechanical-loading and transporting equipment, aside from the standard mine car and locomotive, includes the following units primarily or only for transportation or lifting:

1. Chain, belt and shaker conveyors. Anthracite was an early, if not first user of mother belts and was the first to open an all-conveyor mine.

2. Pit-car loaders, in the development of which anthracite played a leading role.

Equipment in these classes normally increases output per man-shift by (a) reducing the lift in hand loading and thus making it possible to handle a larger tonnage before fatigue forces a halt for recuperation; (b) supplying more continuous transportation and thus reducing time lost waiting for cars and the like. However, conveying or lifting equipment, if it feeds to cars for the final haulage and hoisting step,

also is affected by car service, which needs to be carefully organized to eliminate every possible delay.

Self-loading equipment used in the anthracite region, some of which also performs part of the transportation functions, includes:

1. Self-loading scrapers, developed in the anthracite region.

2. Shaker conveyors equipped with self-loading heads or duckbills.

3. Loading machines—still few in number and largely confined to rock-loading types.

Self-loading equipment, where it can be applied, is by its nature inherently higher in capacity. By substituting power for human muscles it substantially increases output per man-shift. With the same crew, for example, a self-loading head will increase production from the same chamber as much as 50 to 100 percent compared to hand loading onto the conveyor.

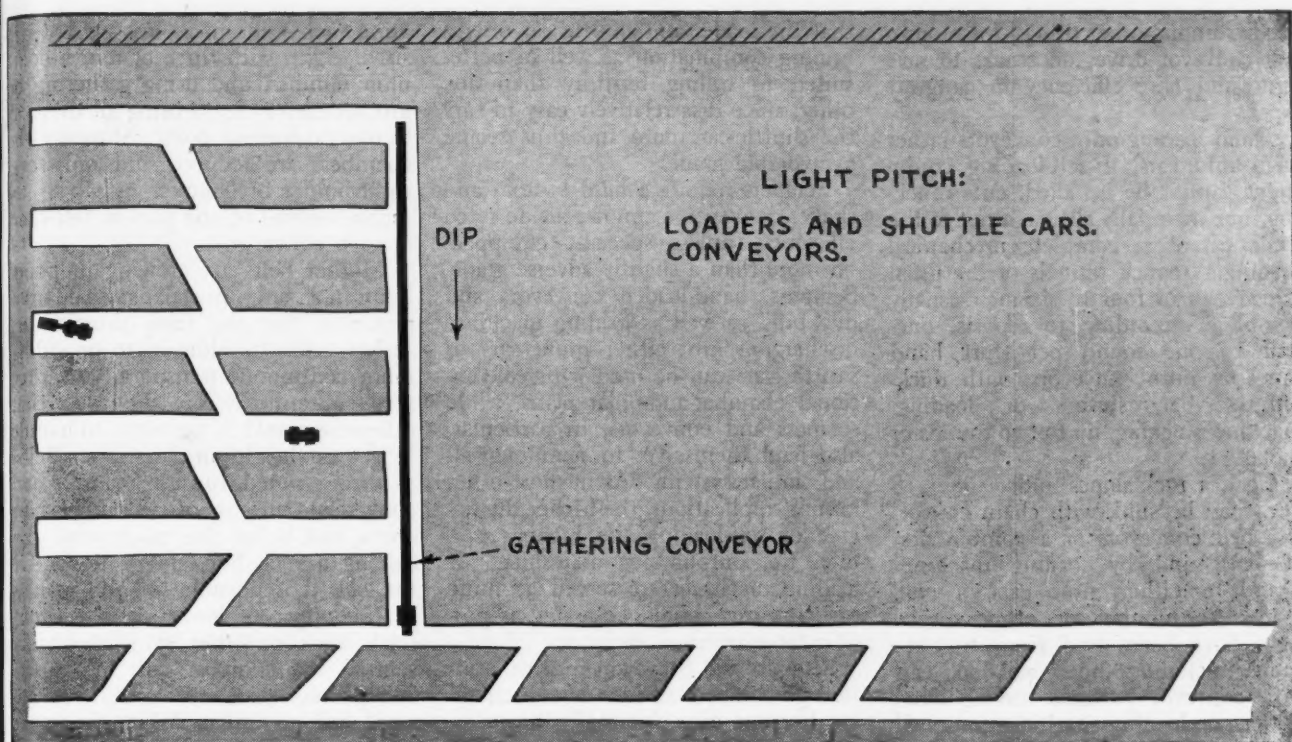
Anthracite has yet to use another new item in transporting equipment—the shuttle car. This reflects, in part at least, the fact that loading machines, aside from scrapers and duckbills, still are few in number. Like the big, modern mine car, the shuttle car provides, among other things, high capacity in the changing unit—a major factor in high loading-machine performance.

Some of the characteristics of these various types of equipment are, briefly, as follows:

Self-Loading Scrapers—Able to pull up grades within reasonable limits as well as on the level or down. Permit a reasonable flexibility in mine layout when necessary. Need a hard bottom and careful shooting for best performance. Lend themselves to working upper veins by scraping to rock holes or lower veins by pulling to an elevating conveyor. Able to work in the thinnest practicable seams without the necessity of taking top and bottom in chambers or other working places.

What Loaders Offer

Loading Machines—Now available for working coal as thin as 30 to 36 in. Coal models also may be used in rock with reasonable performance. Where loading machines can be used they normally provide the highest output per man-shift. May be served by mine cars, shuttle cars, conveyors or scraper haulers. Although usually installed in level or nearly level coal, loading machines are being used regularly in veins pitching as much as 10 to 12 percent or more and in sinking slopes in rock or coal on pitches up to 18 deg. or more. In at least one instance, variations resulting in grades up to 30 percent were met by installing cleated tracks up the pitch to enable the crawler loaders to get to the face. The question of operating loading machines on pitches still is to be fully explored but experience to date indicates the prospect of wider use than heretofore.



Light-pitch work with short auxiliary slope, cross-pitch chambers and down-pitch gathering conveyor.

Shaking Conveyors—An efficient transportation unit in chambers when hand loaded; capacity in chambers and gangways is materially increased when duckbills are added to convert them into loading machines. Special models are designed for rather steep inclinations when delivering to cars in gangway work but in the case of standard machines a level, favoring or only slightly adverse grade generally results in better performance. Adaptable to substantial changes in direction without the necessity of extra drives or motors and can be provided with a number of accessories for different types of installation and application.

Chain Conveyors—Another efficient transporting unit in chambers or gangways although the distance normally is limited to less than 400 ft. unless the machines are installed in tandem. Changes in direction require extra drives. Able to pull coal upgrade with little loss in efficiency, with some special elevating types designed to operate on pitches up to 30 deg. or more.

Belt Conveyors—Used primarily for gathering and main-line haulage, where they perform continuously and efficiently. Normally, however, must be laid exactly straight, although some operators have installed such conveyors with slight curves and report successful operation with only slight additional belt wear. Belt manufacturers, however, frown on such practice. Major changes in direction require extra drives. Belt conveyors can operate successfully over rather rolling terri-

tory and may be used to pull coal upgrade up to about 18 deg. They may be made reversible to carry supplies into the working territory and also lend themselves to development of overlying and underlying veins through rock holes. Belt and other types of conveyors may be used in the thinnest veins practicable to work.

Haulage in the Section

Shuttle Cars—Available in capacities up to 10 tons and in various heights for coal as low as 36 in. With either battery or cable-reel power, shuttle cars provide highly flexible transportation. When powered by batteries, adverse grades should be kept to a minimum, although in rolling coal such cars have operated regularly on short grades up to 6 or 8 percent against the load and when boosted or changed have been able to complete full shifts regularly. When equipped with cable reels, their pulling power remains constant throughout the shift and their ability to pull uphill is limited only by breaker setting and traction, with soft bottom, mud and water as factors in the latter. Within limits of breaker settings, traction and battery capacity, if batteries are used, shuttle cars are relatively little affected by reasonable grade variations. Shuttle cars are being used successfully with loading machines on grades up to 10 or 12 percent or more. As with loading machines, the possibilities of operation on pitches are yet to be fully

explored, but it is expected that the loader-shuttle-car combination will find wider use in pitch operation.

For purposes of analyzing the adaptability of various mechanical-loading and transporting units, anthracite mining operations might be classified as follows:

1. Gangway work, slope sinking in coal or rock and rock tunneling.
2. Flat or light-pitch first mining, usually by the chamber-and-pillar method.
3. Moderate-pitch first mining, meaning mining on pitches up to and including the maximum sheet-iron magnitude, also usually by the chamber-and-pillar method.
4. Steep-pitch mining where breast-and-pillar or other steep-pitch methods must be employed.
5. Second, third and other re-mining.

Practically every type of mechanical-loading and transporting equipment designed for coal also can be used in level rock tunneling as well as in driving gangways. In addition, several anthracite companies have installed special rock shovels, loaders, scraper-loaders and conveyors. As in regular chamber-and-pillar production, use of self-loading equipment (loading machines, scrapers, duckbills, etc.) normally increases daily footage and productivity per man. Where coal and rock must be taken, the conveyor, in particular, permits alternate coal and rock work where the vein is level or nearly level. The anthracite region gets

credit, among other things, for mounting conveyor drives on trucks to save time and raise efficiency in gangway work.

Hand loading onto conveyors rather than into cars, if self-loading equipment cannot be installed, cuts mucking time materially although not to the same extent as complete mechanical loading. In rock tunnels of the usual size, crews of four to six men usually complete, according to reports, one-half to one round per shift hand mucking onto conveyors; with duckbill, scraper, slusher or loading-machine mucking, up to two rounds or more.

Coal or rock slopes under about 18 deg. may be sunk with chain conveyors, belt conveyors or a combination of both and by loading machines served by either mine cars or conveyors. A number of other special units have been used from time to time, including hoist-operated cars with conveyor bottoms serving hand loaders or loading machines and belt conveyors on trucks operating on tracks parallel to the regular track. These portable belts are let down to the face for loading and discharge over a short cross conveyor to mine cars on the regular track. For steeper pitches, several Far Western mines have found the "hell-diver," a scoop resembling a slip scraper mounted on a heavy weighted truck, very helpful in speeding up slope sinking. The unit is dropped into the coal by a hoist, the scoop is raised and then the hell-diver is pulled up and dropped through a crosscut on an elevated spur track to discharge to cars in the parallel opening.

Slope-Sinking Results

Crawler loaders used in sinking belt slopes 6 to 7 ft. high and 12 to 16 ft. wide on inclinations up to 18 deg. usually average, with sinking crews of four to six men, 5 to 8 ft. in rock with conveyor service. With mine-car service, reported advances with similar crews range from 3 to 6 ft. per shift.

Every type of mechanical-loading and transporting equipment, subject to certain height, bottom and grade limitations, can be used in flat or nearly flat mining. Loading machines and shuttle cars cannot as yet go into coal under about 30 to 36 in. and the shuttle car works best with a firm, dry bottom. While, as stated, the practicable grade limitations for shuttle cars and loading machines are yet to be worked out, they are being used regularly on pitches up to 10 to 12 percent or more. So long as pitches remain under about these figures, it also seems

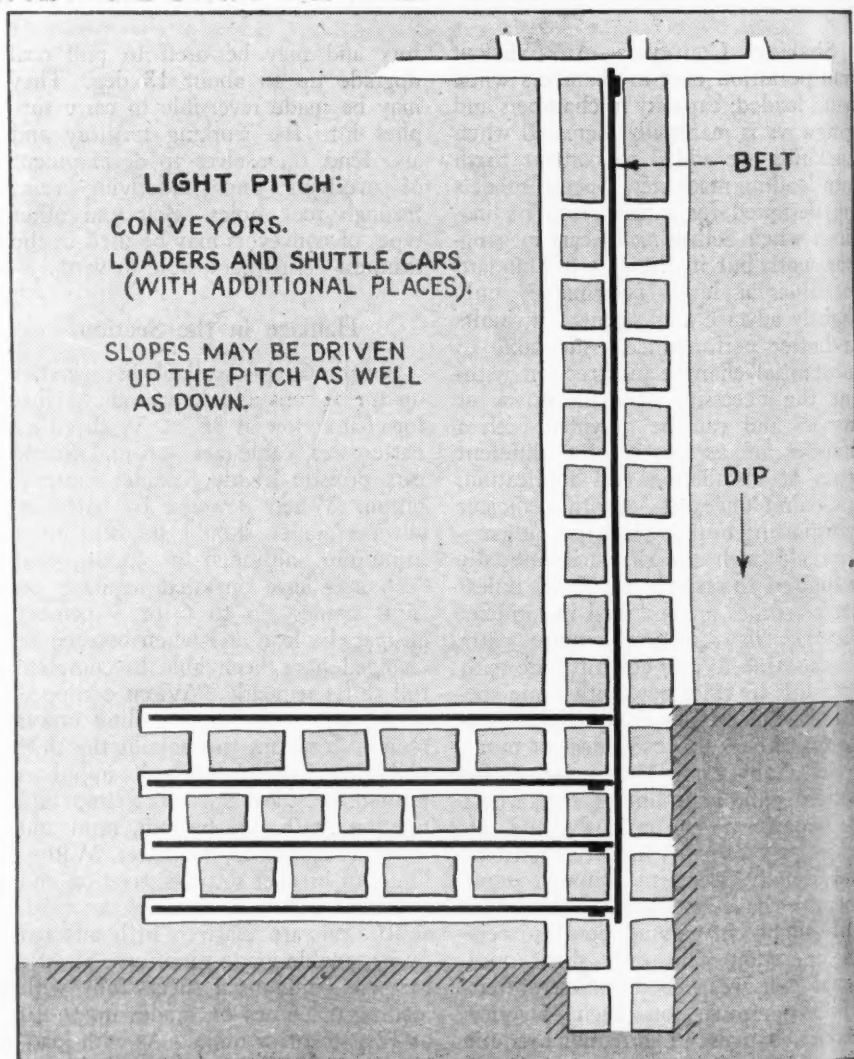
that the loader and shuttle car offer a mining combination as well or better suited to rolling territory than any other, since it is relatively easy to vary the shuttle-car route and thus secure a favorable grade.

Scrapers require a hard bottom and shaker conveyors cannot provide rated efficiency, unless specially equipped, on more than a slightly adverse grade. Scrapers, hand-loaded conveyors and duckbills, as well as loading machines discharging into either mine cars or shuttle cars can be used with conventional chamber-and-pillar plans, while scrapers and conveyors, in particular, also lend themselves to semi-longwall and similar systems. As in most other mining applications, the higher the degree of self-loading the higher, as a rule, the output per man-shift. If loading machines are served by mine cars, the cars should be as big as possible for maximum efficiency.

Scrapers and conveyors may be operated on the basis of each one discharging to mine cars. Normally, however, higher efficiency is attained by oper-

ating such units in groups up to, say, six or eight, with three or four a common number, and using gathering or mother conveyors to bring all the coal to one car-loading point. Stoppages in chambers are reduced and only one car trimmer or chunker usually is required instead of one part or full time at each conveyor.

Mother belts are growing in popularity not only in taking coal from conveyors but also from shuttle cars in low coal. In addition to providing more continuous transportation, they save substantially on the rock that otherwise would be necessary to handle to get car height in gangways. Belts, as already noted, furnish a simple and convenient means of working veins above and below the main vein. By driving a rock hole up or down for the belt it is possible to mine panels in the upper or lower veins without track, rock or other work at a substantial reduction in cost. Scrapers and gathering-conveyor units also are employed in similar fashion in upper veins, the coal coming to rock holes,

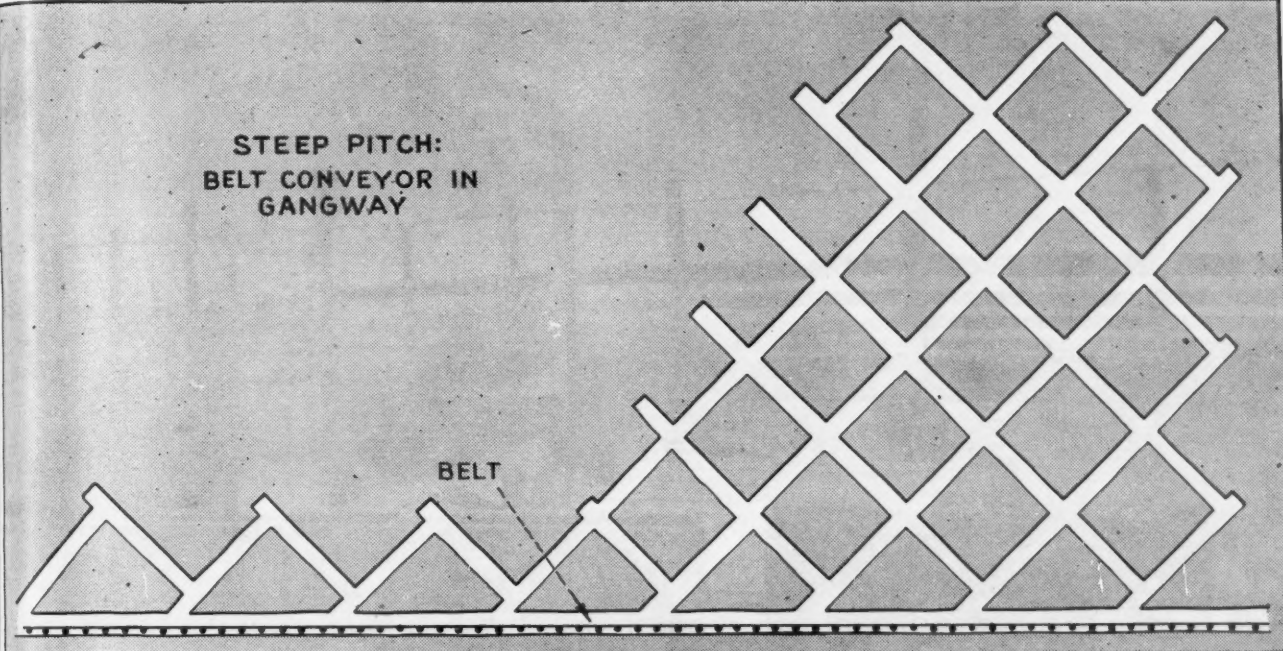


One method of working cross-pitch places from belt slope in light-pitch coal.

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STEEP PITCH: BELT CONVEYOR IN GANGWAY



Belt conveyors lend themselves to gangway transportation in steep-pitch mining.

or in lower veins, to elevating conveyors, although usually the territory possible to work with one set-up is reduced as compared with that possible with another belt.

Since gravity can be brought into play, the field for new-type mechanical-loading and transporting equipment is reduced in steep-pitch work, here defined as that beyond which the coal will run on the rock. The belt conveyor is the principal unit left, although other equipment may be used in driving gangways or receiving coal and relaying it to the belt. Some of the reasons for belt installations in steep-pitch work include smaller gangways and elimination of runarounds at chutes, thus reducing development expense; more continuous transportation; and fewer men in gangway haulage. With belts and the proper modifications in mining plans, some engineers feel that where it is now necessary to put gangways in rock they can be transferred to the coal with no adverse results and a considerable saving in tunneling and rock-hole expense.

Belt Haulage on Pitches

On the higher sheet-iron pitches, belts also work very well into the conventional chamber-and-pillar plans and offer much the same advantages as elsewhere. As the pitches get flatter, and especially when they are so low as to require water and pushing, the belt may be supplemented by conveyors or scrapers in the chambers. An alternative to the belt is a short gathering conveyor. Justification for chamber conveyors where sheet iron might

otherwise serve lies in whether they result in any appreciable increase in output per man-shift. If much pushing was required, a conveyor or scraper might be indicated. To reduce shoveling onto the sheet iron or the conveyor, a self-loading head might be a further step.

The preceding presupposes gangways on the strike with chambers up the pitch. In light- or moderate-pitch work under, say, 18 deg., belts or long chain conveyors may be installed in auxiliary slopes up or down the pitch from the main gangway to permit working chambers and pillars on the strike with conveyors or other equipment, such as loaders and shuttle cars where the pitch is less than, say, 10 to 12 percent. Experience has proved the soundness of such plans.

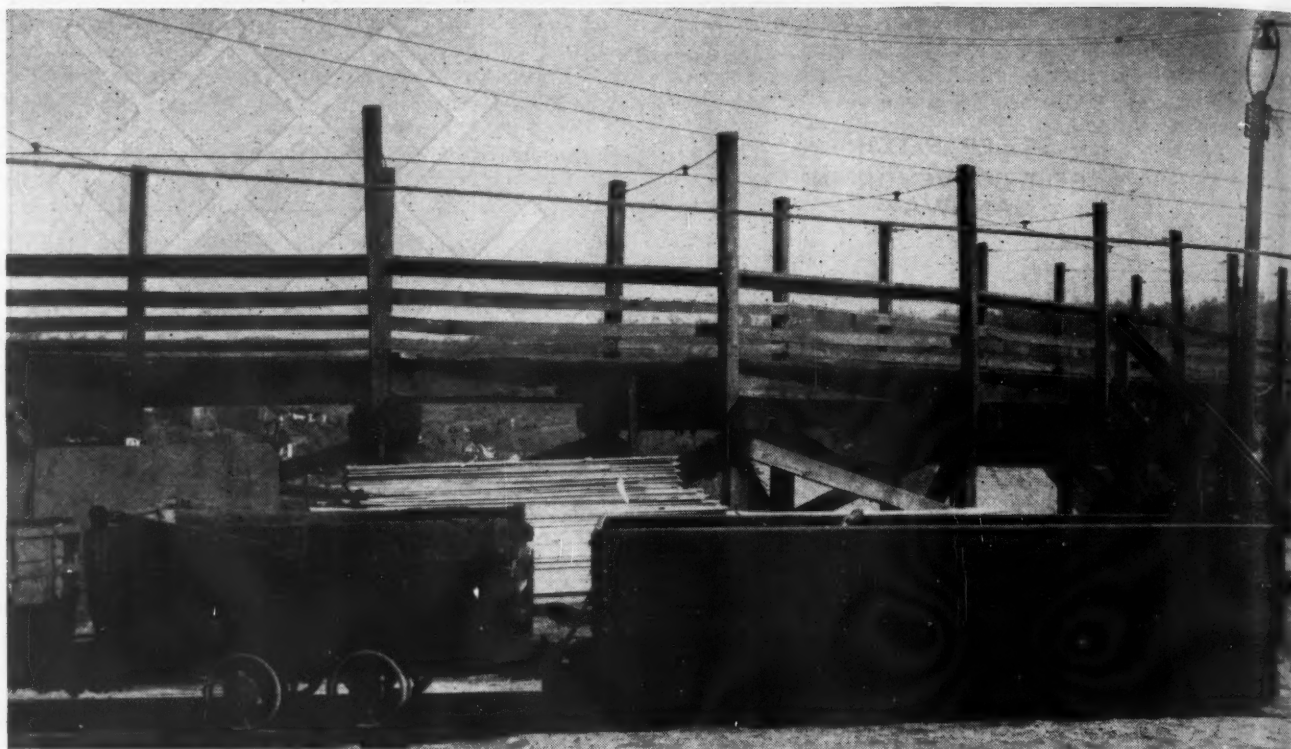
Mining in the anthracite region, unfortunately, is not all virgin work where there is a free opportunity for installing new systems built around new types of equipment. Much of the coal, in some regions at least, must be wrested out of territories already mined once, twice or oftener. Caving and crushing, complicated by, in many cases, lack of information as to how much coal remains and its exact location, are among the major difficulties, along with, frequently, an aggravated drainage and ventilating problem, not to mention keeping the new openings open.

Getting in with the least expense is one goal. Getting the coal out quickly, completely, economically and safely is a second. The operator has a choice of going in with standard mine cars and track or with some other

transporting means that might cut down the size of the openings and the quantity of material to be handled. Conveyors and scrapers, because they are more flexible in negotiating grades and in taking care of changes in direction while reducing the size of the opening necessary to get in to the coal, thus reducing the quantity of refuse to be handled, are a logical means of tackling old work. The number in service reflects their advantages.

Remining With Loaders

Opportunities for self-loading equipment are somewhat curtailed in remining old pillars, but in addition to scrapers there are possibilities under certain conditions for duckbills and loading machines. The duckbill still preserves the other advantages of the conveyor while speeding up the handling of both rock and coal. With loading machines, the openings usually have to be made larger, but, on the other hand, where the loading machine can be used, it materially increases productivity in handling both coal and rock as compared to hand loading. For greater flexibility where conditions permit, the loader-shuttle-car combination has been suggested for old work. In any event, it is felt that among the various scraping, conveying, transporting and loading units now available, a unit or combination of units can be found to provide better performance under most of the conditions encountered in re-mining old territory.



Old and new in cars at Blaine mine. Old wood car at left holds 1½ tons machine loaded; new steel car, 5 tons.

BIG CARS

Complete Modernization of Blaine Mine

Automatic Dumping Releases 14 Outside Men for Other Work — Output of Loading Machines Served Directly by Mine Cars Doubled — With Railroad-Car Dumper, Washer Becomes Central Plant for Two Mines

MOST OF THE mobile loaders in Blaine mine of the Lorain Coal & Dock Co., Blaine, Ohio, are served by rubber-tired shuttle cars and elevators—a system in which small cars do fairly well—but that fact did not deter company officials from replacing the 1½-ton wooden cars with 5-ton drop-bottom steel cars. Installation of the new cars, together with a dump bin and conveyor arrangement at the preparation plant, released 14 outside men to other jobs. On the three loading machines served directly by mine cars the crews raised their tonnages 56½ percent. Those advantages of greater production and less labor are supplemented by large savings in car lubricants, car-repair materials, reduced coal spillage, greater safety and handling of fewer trips. Blaine mine

is a drift operation in the Pittsburgh seam consisting of 5 ft. of coal and 12 in. of drawslate, which comes down with the cut and is loaded out with the coal for elimination by picking and washing at the preparation plant. Of the nine Joy 7BU loading machines in use six are served by 5-ton rubber-tired shuttle cars. Eleven shuttle cars are in use, eight powered by Philco batteries and three cable-reel. The main haul is four miles one way. Production of cleaned coal from the mine is 2,700 tons, working two underground and two tippie shifts.

The old mine cars were plain-bearing units, 42-in. gage, wood body, swing endgate, 47 in. high, with an average capacity of 1½ tons of raw coal, machine loaded. Dumping at the tippie was done on two tracks

equipped with crossover dumps. These tracks were high enough on the hillside so that coal was fed by a level feeder directly to the main screen.

To provide for dumping the drop-bottom mine cars and get the advantage of a large storage bin, it was necessary to install a belt conveyor from the bottom of the new bin to the shaker screen. This bin is of wood and holds 450 tons.

Incorporated in the new construction was a 400-ton underground hopper for dumping railroad cars of raw coal shipped from the company's Stanley mine for preparation at Blaine. From the railroad hopper a reciprocating feeder and a 48-in. x 139-ft. (c.-c.) belt conveyor on a 13-deg. inclination deliver to the belt carrying raw coal from the mine-car hopper to



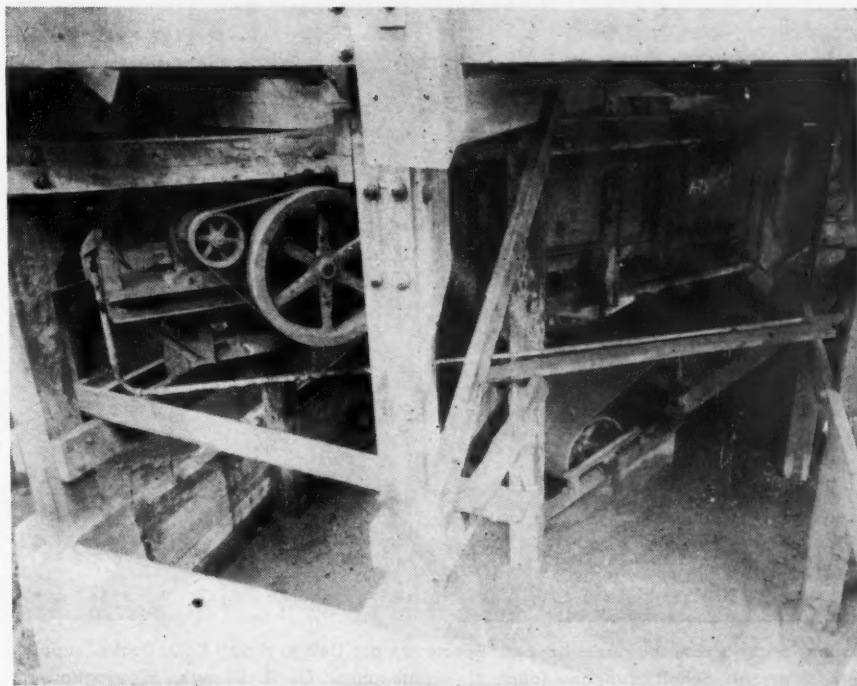
The motorman dumps the trip at one pass without help. Capacity of the hopper under this new dump house is 450 tons.

the tipple screen. That conveyor, which also is 48 in. wide on a 13-deg. slope, is 93 ft. long (c.-c.). The feeder from the mine-car hopper to this belt is another reciprocating unit and a duplicate of the first. Feeders and belt conveyors were furnished by the Morrow Mfg. Co.; idlers by Robins Conveyors, Inc., and the belting by the United States Rubber Co.

Two hundred of the new mine cars were purchased. They are Sanford-Day "1-2-3 automatics" with the "Di-Dapper Nockout" release for the doors. In these the conventional latch lever arm has been left off and the car carries only a small emergency door-releasing device. Dumping at the bin is entirely automatic and is effected by a "Di-Dapper" which projects up between the rails. It can be lowered temporarily by a lever in case any cars need be bypassed without dumping.

Height of the new cars is 40 in.; over-all width, 66 in.; length, bumper to bumper, 13½ ft. Track gage is 42 in.; wheelbase, 46 in. The car weighs 4,950 lb. It is equipped at one end with a spring draw and buffer and is without brakes. The wheels, 14-in., are "S-D Floater" demountable with ball bearings. Bodies are of sheet steel of the ordinary grade.

Track grade over the trestle and dump hopper is 1½ percent in favor of the loads. Although on the empty side the track makes a 180-deg. curve back to the shop track and on to the



Reciprocating feeder under the 450-ton mine-car hopper. Below it is the tail of the 48-in. belt which elevates the coal to the tipple shaker.

old empty track, the trips after being dumped are pulled back the same way they came in. Because of the limit imposed by the length of a runaround in the mine, 32-car trips are the maximum handled.

The 14 fewer men now employed on the outside by reason of the new cars include car repairmen. Now one man instead of four is retained for that job but spends most of his time

on other maintenance work. The 13 jobs from which men were released to other duties were as follows: two car dumpers, two dump feeders (pushing cars to dump), two droppers (bringing cuts of 15 cars for dumping), two motor receivers (set brakes and helped motors get out of way), two couplers (empty cars) and one car greaser.

Mine rails are 60-lb. on the mains



The loads of raw coal in the foreground are from Stanley mine. Just ahead of them, but not showing, are the underground dump hopper, reciprocating feeder and belt delivering to a new tipple feed belt which elevates from the mine-car hopper in the background.



Pushing a trip across the dump hopper. Spectators are (left to right): F. D. Drake, supply clerk; Marshall Schell, superintendent of maintenance; O. O. Clough, Westinghouse; and Arnold Schell, general mine foreman. In the motor is J. M. Zarotney, shop foreman.

and 40-lb. on the cross-entries, face entries and in those rooms where machines load directly into mine cars. Fifteen-ton MH77-Jeffrey locomotives working singly handle the main haulage and others of the same make, but 10-ton MH110 work the secondary haulage.

Derailments with the old cars caused numerous delays. In the nine months that the new cars had been in use at the time this article was written

there had been no derailments of consequence. Another tremendous advantage is reduced spillage with the new cars. It formerly was the practice to keep five men employed continuously at track cleaning and they never caught up. Now they have about caught up and most of the tracks are clean for the first time in years.

The figure of 56½ percent increase in production per crew for the two loading units which load directly into

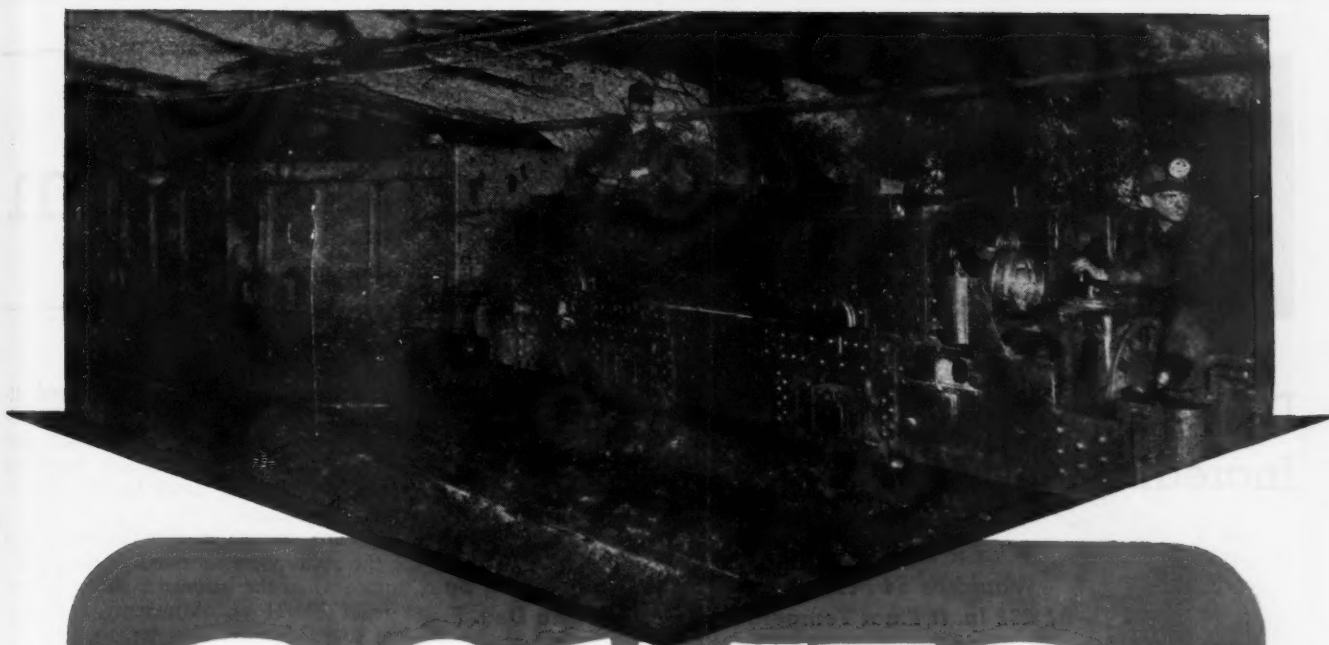
mine cars was based on performance for the last month of operation with the old 1½-ton cars and a typical month with the new 5-ton cars. The comparison is on cleaned coal shipped rather than on raw-coal loadings. The increase brings the track units practically up to the shuttle-car units, so it is no longer the plan to install additional shuttle cars.

New Cars for Stanley

Stanley mine, the tipple of which is 1½ miles from Blaine up Wheeling Creek, was reopened in November, 1944, after having been closed since 1938. At the time of this writing the production was 300 tons per day from two Joy 7BU machines loading directly into old 1½-ton cars moved there from Blaine. Fifty new 5-ton cars exactly the same as those at Blaine have been ordered for Stanley. The old steel tipple had been left intact and that structure is now being used for dumping the raw mine-run to the railroad cars.

Blaine mine was opened in 1908 and was never shut down for a prolonged period. It and Stanley mine afford the Blaine plant at least ten years of additional life.

S. B. Johnson is president of the Lorain Coal & Dock Co. and L. J. Lorms is general manager. E. G. Schell is general superintendent of Blaine and Stanley mines. Arnold Schell is general mine foreman at Blaine and A. J. Prokes is general mine foreman at Stanley.



POWER



WHEN THE POWER IS EXIDE TONNAGE FIGURES CLIMB

Numerous records show that in mines where Exide-equipped locomotives and shuttles are used coal handling is speeded up all the way from face to cage. Loaders are kept busier, car change time is reduced, and main line haulage sets a faster pace.

Exide Batteries are designed and built to meet the increased production schedules which war-time demands have set. Their high volt-

age provides ample power for every need and assures sustained speeds throughout each shift. And their rugged construction keeps them on the job day after day. For dependability, long-life and ease of maintenance, you can always count on Exide Batteries.

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The Foremen's Forum

Dying Mine Fires Would Create Incredible Gages If Seals Were Tight

With a Temperature of 1,000 Deg. F. Shrinkage Would Be 64 Percent and Water Gage Would Be 262 In. If Final Temperature Would Be 60 Deg. F.

QUALITATIVE facts about mine fires are interesting, but only when quantitative facts are available do we get any correct appreciation of the problems presented. An effort is here made to reduce to figures the quantity of atmosphere needed to fill the void created by the cooling of the fire and the pressures that impose themselves on the inclosure around a sealed mine fire. The temperatures chosen as the intensities of heat of the inclosure may not all be reasonable, though certain crop fires and heading fires reach quite a high temperature. In any event it is better to be sure than sorry.

Incredible Water Gages

In the fourth and seventh columns of the tabulation accompanying this article are shown the pressures that will be imposed on the stoppings, coal ribs, roof and floor of the fire-sealed inclosures when the temperatures designated in Column 1 fall to 60 deg. or 80 deg. F. respectively. These pressure differences would be created only provided that the enveloping

materials completely preclude air or other gas from entering from the atmosphere exterior to the inclosure and, in fact from the measures themselves, because methane or carbon dioxide may be present in the interstices of the measures where they can be pushed into the inclosure by the passage of air from the inclosure's environing walls.

Natural or fan air pressures are quite generally thought incapable of displacing gases from coal in observable quantities, but these mine-fire-created pressures are considerable, and reasonably may be held to furnish an exception. These high values give an idea of the hopelessness of trying to prevent leakage into a sealed area and suggest that, round a mine fire, the pillars, roof and floor may contribute much occluded gas to the tightly sealed inclosure in a short time interval, especially in the early cooling-off period. In fact, the cooling may come as much from contact of entering air and other gas in streams through the walls as from contact between the walls themselves and the fire gases. With such pressures, it is better to pro-

vide for the admission of a polluted atmosphere and, if one not sufficiently polluted is all that can be found for that purpose, to make that atmosphere enter the inclosure well away from the fire, as already suggested.

Perhaps, few realize that the water gage of the atmosphere surrounding the earth's surface when the barometer shows a pressure of 29.921 in. of mercury is equivalent to 407.304 in. of water, so these figures are quite reasonable, even though we are accustomed to regard water gage as a matter of 3 or 4 in. or at most 10 in., and only in fighting mine fires do we try to convince ourselves that we are capable of choking off water gages of such immensity as the highest of those in the table.

Wherever the stoppings are well built, much of the methane and carbon dioxide in the enclave possibly comes from interstices in the strata even though the hypothetical pressures are never reached. After an inclosure is opened, its capacity for producing methane and carbon dioxide thereafter probably is greatly reduced.

Shrinkage and Temperature

From the tabulation and the graph, it will be noted also that it is insufficiently correct to assume that the shrinkage in volume and the fall in pressure resulting from the drop in temperature can be calculated by taking the average temperature of the wide range of pressures in the sealed area instead of the temperatures of the component parts. If the temperatures given in the table are regarded as tempera-

CALCULATED SHRINKAGES OF ATMOSPHERES IN SEALED FIRE AREAS WHEN PRESSURE IS MAINTAINED CONSTANT AND ALSO UNBALANCED PRESSURES ON THE SEALED FIRE ENVELOP IN POUNDS PER SQUARE INCH AND IN INCHES OF WATER GAGE IF NO AIR CAN LEAK INTO INCLOSURE

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Original Temperature of a Section of the Sealed Inclosure Deg. F.	Volume as Percentage of Original Atmosphere After Temperature Falls to 60 Deg. F. From Temperature Shown in Column 1 if Inclosure Admits Air	Shrinkage as Percentage of Volume of Original Atmosphere When Heat Intensity Drops From Temperature in Column 1 to 60 Deg. F. and Inclosure Admits Air	Pressure That Would Fall on an Absolutely Airtight Inclosure When Temperature Given in Column 1 Drops to Mine Level (60 Deg. F.)		Volume as Percentage of Original Atmosphere After Temperature Falls to 80 Deg. F. From Temperature Shown in Column 1 if Inclosure Admits Air	Shrinkage as Percentage of Original Atmosphere Where Heat Intensity Drops From Temperature in Column 1 to 80 Deg. F. and Inclosure Admits Air
			Lb. per Sq. In.	Water Gage In.		Pressure That Would Fall on an Absolutely Airtight Inclosure When Temperature Given in Column 1 Drops to Unsealing Level (80 Deg. F.)
						Lb. per Sq. In.
						Water Gage In.
1000	35.62	64.38	9.46	262.08	36.99	63.01
900	38.23	61.77	9.08	251.44	39.71	60.30
800	41.27	58.73	8.63	239.07	42.86	57.14
700	44.83	55.17	8.11	224.58	46.55	53.45
600	49.06	50.94	7.49	207.36	50.94	49.06
500	54.17	45.83	6.74	186.56	56.25	43.75
400	60.46	39.54	5.81	160.96	62.79	37.21
300	68.42	31.58	4.64	127.96	71.05	28.95
200	78.79	21.21	3.12	86.35	81.82	18.18
100	92.86	7.14	1.05	29.08	98.43	3.57
80	.....	.....	.....	.....	100.00	0.00
60	100.00	0.00	0.00	0.00	.....	.....
Weighted Average of Above	57.24	42.76	6.29	174.07	58.51	41.49
Figure if Average Temperature Were Used to Calculate Volume and Shrinkage	59.95	40.05	54.00	46.00



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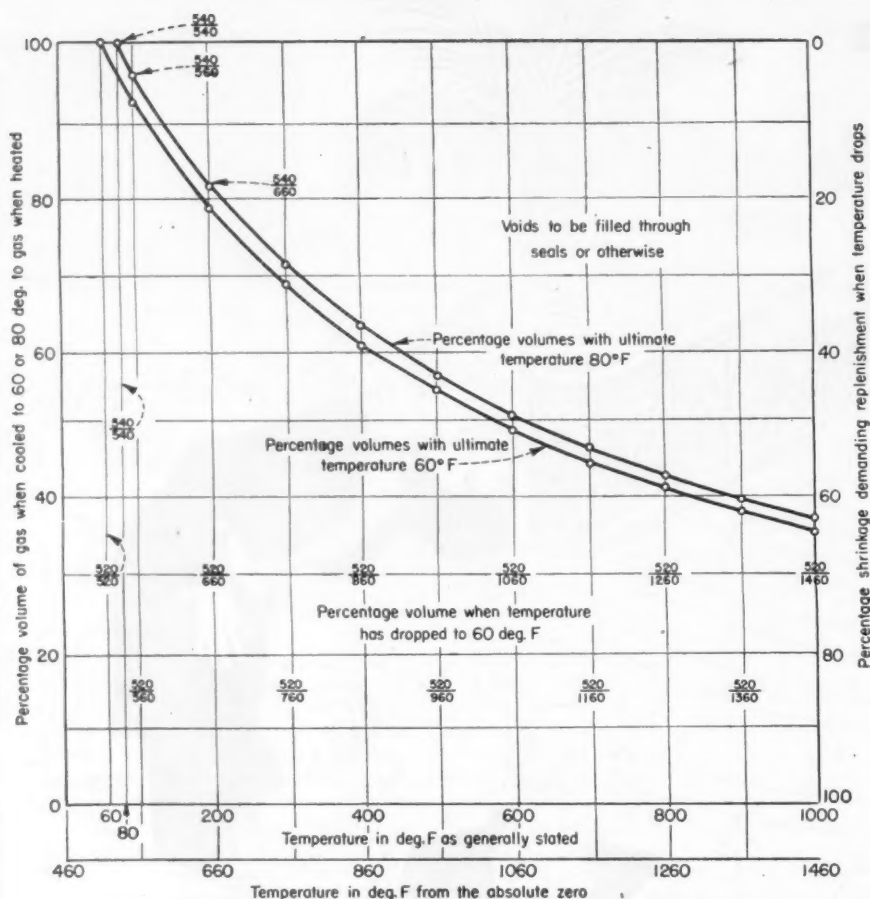
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COAL AGE • September, 1945

119



Shows percentage volumes after shrinkage and voids to be filled with different first and final temperatures. (Note the graph is not a straight line.)

tures in sections of a single sealed area, their values naturally varying as the points recede from the fire center, it will be seen from the two lowest cross lines in the tabulation that the approximate average contraction and pressure is not the same figure as would be obtained if the contraction and pressure were based on the average temperature of the fire area at the time of sealing.

The difference would not be so significant if a shorter temperature range was being considered, as in the earlier part of this series of articles. Only where the sealed area is quite small and the fire exceptionally brisk can figures for temperatures as high as 1,000 deg. F. be expected and then possibly only when the fire has been activated after the stoppings have been erected, as may happen with a crop fire or one where stored electricity is available to supply heat. In almost all cases, lower temperatures and pressures will prevail, and these can be noted in the table on p. 118.

How Table Was Calculated

It will be well to show how the figures have been obtained. The temperature of normal mine air is taken as being 60 deg. F. or $60 + 460 = 520$ deg. absolute F. The temperature of the fire area when the coal is believed to be cool enough to remove the seals and to admit air to that area is taken as 80 deg. $= 80 + 460 = 540$ deg. absolute F. The top figure in

Column 2 is obtained by dividing the absolute temperature of the normal atmosphere in the mine (520 deg. F.) by the absolute temperature corresponding to 1,000 deg. F. on the usual scale $= 1,000 + 460 = 1,460$ deg. absolute F. That figure is 0.3562, or 35.62 figured as a percentage, and represents the volume to which the atmosphere in the sealed area would shrink if the pressure were maintained during the shrinking.

That figure is about the space it will occupy in practice throughout the period in which the fire area remains "sealed," for the space, despite the reduction in volume, is filled by leakage and by the entrance of gases from the inclosing walls. The volume is proportional to the absolute temperature only if the pressure remains the same, so that volume of the air at 1,000 deg. F. will be $520 \div 1,460 = 0.3562$ of the original volume at 1,000 deg. F. after the temperature is lowered to 60 deg. F. But the pressure cannot remain the same, unless more "atmosphere" is brought in to fill the void.

The volume of atmosphere needed to make up for the shrinkage will be $100 - 35.6164 = 64.3836$ percent, about the figure given in Column 3. But if the air should by some miracle not get in, the volume of the original atmosphere of the inclosure will not be reduced and the pressure of the atmosphere will drop in the proportion of 1,460 to 520 $= 2.807692:1$, in accordance with Boyle's law, which declares that the pressure of a

gas multiplied by its volume is always a constant. Checking this, $2.807692 \times 0.356164 = 1.000$.

Suppose the pressure of the atmosphere at sealing is P lb. per square inch and after cooling to 60 deg. F. without leakage is p lb. per square inch; then the pressure on the enveloping ribs, roof, floor and stoppings will be $P-p$ lb. per square inch. This is the unbalanced pressure that has to be resisted. The pressure of the P at sea level $= 14.7$ lb. per square inch, as can be seen in any mechanical engineers' handbook. According to Boyle's law, pressure is inversely proportional to volume, so p will equal $P \div 2.80762$, or $0.356164 P$.

$$\text{So } P-p = 14.7 (1-0.356164) \\ = 14.7 (0.643836)$$

From this is deduced the first vertical line of figures in Columns (4) and (7) which are the figures in Columns (3) and (6) respectively multiplied by 14.7. To get the water gage, the figures thus obtained are multiplied by 144 to obtain the pressure per square foot instead of per square inch and the product divided by 5.2 to obtain the water gage, the pressure of 1 in. water gage being equal to 5.2 lb. per square foot.

Motor Stops When Operative Leaves It

Locomotives in a metal mine in Colorado are equipped with an electric switch operated by a pedal in the cab of the locomotive, says John F. Shaw to Dan Harrington, chief, safety and health, U.S. Bureau of Mines, in a letter published in the April issue of "Mining Safety," the News Letter of the Mining Section of the National Safety Council.

To complete the electric circuit, the pedal must be pressed down, and only when the pedal is thus depressed can the locomotive operate. As soon as the pedal is released, the locomotive stops. Before the motor will operate, the controller must be turned back to the off position, the pedal must be pushed down, and the controller again be so moved as to complete the circuit. With this arrangement, the motorman must be seated in the cab or the locomotive cannot move. Thus are prevented accidents which often occur when the operative leaves his cab and falls or is prevented otherwise from getting back into place. Under these circumstances, the locomotive will continue to run without anyone at the controller, which obviously is dangerous.

Accidents occurred because the operatives of the small storage-battery locomotives used in stope haulage wanted to step out to uncouple cars while the cars were in motion. The rear ends of these locomotives never were inclosed, so the operative could lean over and operate the coupling device. Though a piece of $\frac{3}{4}$ -in. sheet iron, curved to fit the rear bumper and as high as the shoulder of the operative when seated, is attached to the rear of each locomotive, the operative can uncouple the car next to the locomotive without leaving his cab.

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WIRES and CABLES

State-Board Questions

Mine Foremen, Alabama

Q.—Explain the proper method of setting posts:

- In a level bed where roof is soft and bottom hard.
- In a level bed where roof and bottom are both soft.
- In a level bed where roof and bottom are both hard.
- In a pitching bed where roof and bottom are both hard.
- What size of cap boards should be used in each of the above instances?

A.—(a) **Roof Soft, Bottom Hard**—In a level bed, where the bottom is hard, the posts can be set on the bottom without any risk that they will penetrate it. Such penetration would be undesirable, for it would let down the roof and subject it to stress. As the roof is said, in the question, to be soft, the pressure of the post against it will require cushioning or spreading over a wider area than is afforded by the cross-section of the post. So, wide cap boards should be driven between roof and top of post, and they also should be long, so as to give the roof the needed support between posts. How long and how wide these should be is a matter for observation and experiment. They should be at least as wide as the diameter of the post.

The hardness of the floor, however, may be illusory. The top of the floor may be hard and underneath may be a soft measure, which may make the support treacherous. In this case, foot pieces may be necessary.

(b) **Roof and Bottom Soft**—In a level bed, when the roof and bottom are both soft, both cap pieces and foot pieces are necessary and should be provided of widths the suitability of which in each area has been determined by observation and experiment.

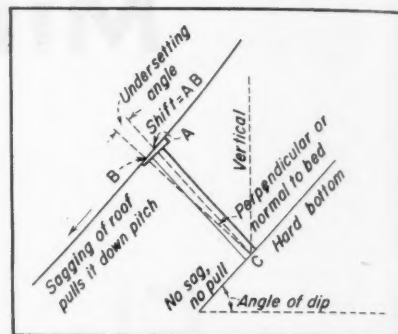
(c) **Roof and Bottom Hard**—In a level bed, where roof and bottom are both hard, the posts need no cap pieces as the post will break before the roof or bottom will be penetrated, unless indeed the hardness of either is temporary and, in the life of the post, will soften and permit penetration. This also is a matter for observation and will depend on the dryness or wetness of both, on the mineral content of roof and floor and on the length of time of exposure. In this kind of floor, hard on the top and soft below, if the working places are driven up quickly and pillars are drawn promptly, no cap pieces or foot boards will be needed.

(d) **Roof and Bottom Still Hard but Pitching**—In a pitching bed, it has been

recommended that the posts be put not perpendicular to roof and bottom but leaning with the top of the post perhaps 5 deg. up from that position toward the vertical, it being expected that the bottom rock or clay would not move downhill at all but that the roof at the top would travel in that direction (see Illustration). In that event, any movement of the roof, and of the top of the prop which is in binding contact with it, would tend to bring the post more nearly into a direction at right angles to the roof and floor, thus tightening it, for, as it lies back when set in place, with its foot in a hole and its cap on its head, it is longer than the coal is thick and thus cannot get loose. On the other hand, if the post leaned the other way, or even was vertical, any movement of the roof down the pitch would move the post into a position in which it inevitably would become loose and fall with its top down the pitch.

A prop on a pitch readily falls because, when it becomes loose, its gravity pulls it over, whereas a prop in a level seam may become quite loose and not infrequently does, possibly from shrinkage or cantilever action. In some rooms, it is not unusual to find several posts which can be upset without apparent effort. They will continue standing, however, because there is nothing to upset them.

When posts fall out in a breast advancing uphill it is thought that the violence of shots has loosened them and that gravity



Method adopted when setting post in a pitching bed so as to prevent the post from falling when the roof sags and so moves down the pitch, dragging the top of the post with it, and when also the violence of shots tends to dislodge it.

has completed their upsetting. This has been another reason for "undersetting" props; that is, setting them with the top up the pitch from the perpendicular or normal.

In the sketch, A B is the distance over which the pressure of the prop on the roof will continually increase, provided that point A in the roof moves over that distance in excess of the movement of the corresponding point C in the mine floor. After that, the pressure will be solely derived from the sag of the roof because the resilience (recovery from stress) of overstressed timber from the compressive strain will be inconsiderable.

Mine Manager, First Class, Illinois

Q.—What are the principal causes of mine fires and what precautions would you take to guard against them?

A.—Electricity is getting to be, or is already, the main source of mine fires. These hazards will be treated in a later instalment. Non-electrical causes of mine fires and the prevention of fires therefrom are as follows:

(1) **Use of Deflagrating, or Slow, Explosives**—"Deflagrating" means "burning intensely," and a deflagrating explosive is one that extends its explosive action rather by rapidity of burning than by shock. In mines where a slow explosive powder, black blasting powder, was used, and the coal caught fire easily, fire chasers often were employed to follow the shotfirer, so as to extinguish fires that the slow powder had ignited.

This was unsatisfactory (1) because

when the percentage of methane was high, an explosion of methane might occur from the long and lasting flame of the slow explosion, and (2) because the job of following a shotfirer and drinking in his powder smoke, and the fire smoke that frequently followed it, was not one of the most cheerful occupations, and its obligations sometimes were neglected. The shotfirer was traveling away from the smoke that he was making because any other direction of travel would be well nigh unbearable and following behind him meant feeling one's way through the murk just when and where it was thickest. When left for a while, the fires would take a hold that might make extinction difficult, and then the smoke would be only the more distressing.

Use of explosives that detonate rather than deflagrate therefore is desirable,

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especially when firing shots in certain of the less mature coals. Whether coal having a propensity for firing is or is not still shot by black or pellet powders, the foregoing illustrates forcibly how risky is the use of such an explosive in those coals which are only slightly less disposed to catch fire.

Perhaps, therefore, it is safe to conclude that, for this reason if for no other, the use of deflagrating powders is undesirable because they may burn and will on somewhat rare occasions set fire to the coal, if not at the mouth of the borehole then at least alongside the body of the burning powder, if such powder is not thrown out of the hole. This may be true of any explosive, but the probability of such an event is less with a detonating explosive, especially if it is dry and in good condition. Arguments in favor of deflagrating explosives are not germane to this question or its answer.

(2) *Powder may be thrown out of the hole in a blow-out shot vomiting both stemming and half-burned charge, and the coal on the floor or the methane in the air may be ignited.* Again, the coal may be blown down at the back of the cut and the methane or coal in that area may be ignited. All these are possible causes of unexplained fires, and they may occur with powders that have been permissible but have become dangerous by reason of deterioration, which makes them burn rather than detonate.

Switching from deflagrating to detonating powders, stemming more tightly and securely, using better stemming and shortening the shothole so that the pressure of the explosion will break down the coal at the front instead of at the rear of the cut are ways of meeting these dangers.

(3) *Mine Explosions*—Mine explosions and mine fires are fellow conspirators. Usually mine explosions cause mine fires, and mine fires only too often cause mine explosions. Mine explosions arise from much the same origins as mine fires, so the way to avoid these will be indicated when the causes of mine explosions are listed.

(4) *Spontaneous Combustion*—Immature (low-rank) coals or coals at depth are subject to spontaneous combustion, but even high-rank anthracites have been suspected of this tendency. Some bituminous coal appears to contain oil, which, when it oxidizes, starts slowly to burn. One persistently combustible coal is remotely associated with torbanite which has been mined in the same neighborhood though in another stratum, and in some few mines oil is present in such quantity that it occasionally drops and dribbles down the props.

The nature of the precautions to be taken against the possibility of spontaneous combustion is not clear. Apparently, the cure is more ventilation to reduce heat or less or no ventilation to provide carbon dioxide, methane, excess nitrogen and other smothering gases. Mediate plans seem to invite trouble, and more ventilation may prove worse than the disease.

In Great Britain, an effort is made to reduce the frequency of such mine fires in working areas by the ventilation of such parts of mines with air containing excess nitrogen. No effort is made to provide air of normal oxygen content. Inspectors are

allowed in their discretion to permit the use of depleted air where they believe spontaneous combustion likely to be a menace.

(5) *Combustion of Wood, Hay and Other Materials*—In the mines, stables should be fireproof with all stalls for horses and mules constructed of steel or concrete, including therein stanchions, partitions and troughs. All hay or straw should be brought into the mine baled and only enough for a single feeding or bedding loosened at one time.

Combustible material should be stored in a fireproof structure apart from the stable with a tight hinged steel or iron door that is provided with a padlock, and the stable should be ventilated by a separate split of air with vents to the return aircourses at a point where such aircourses either need no support or have adequate supports of an incombustible nature.

(6) *Combustion of Litter and Wood*—In most coal mines, paper and other litter soon gets so damp that it is not combustible. Some paper, it is said, will absorb moisture at only 30 percent of air saturation. In some western mines and in deep mines generally, the air is so dry that litter is quite a menace. In these mines, the explosives boxes, the permanent brattices and overcasts that in ordinary mines might be of wood are constructed of cement mortar or concrete. Some cover the wood with flattened cans and with steel plates, which, excluding air, make wood incombustible.

However, in mines, no structures, substations, weigh sheds, foremen's offices, tool sheds, machine shops, cubby-holes and the like should be constructed of wood or other combustible matter. In such construction, the coal should be covered with a substantial wall of cement mortar or concrete. In many such buildings, electric heating or heat from mechanical brakes makes the air dry and wood highly combustible.

(7) *Combustion of Oily Wastes*—Oil and especially oily rags are subject to spontaneous combustion.

(8) *Playing With Fire.*

(9) *Surface Fires Communicating With Underground Operations*—Sometimes sinkholes due to mine caving are filled with garbage and brush which are later lighted by adults or children. Such fires may extend inside the mines and do much damage.

(10) *Fires of Brush, Sheds or Buildings Near a Mine Entrance*—These may be particularly dangerous where the entrance is an intake and of combustible material so that a surface fire may be drawn inside.

There are many ways of starting fires like smoking, breaking an incandescent lamp, resting such a lamp against a combustible, use of open lights, discharge of steam or static electricity, mechanical friction, all of which may ignite methane, causing a combustion or an explosion, thus starting a mine fire. These are covered broadly by Section (3).

Coal Age Quiz

Q.—Why is it always unsafe to get out of a car on the trolley side of the heading?

A.—If the car is built of wood, it would seem safe to get off on the trolley side, but the steel drawbar, the steel braces and the steel end-gate hinge all are likely to carry the current to the ground from the man who touches the trolley wire. Also he may touch one of the car wheels. But you ask what if he wears a cap made of plastic, which is dielectric; that is, has a high resistance to current. That gives a lot of protection, it is true, but he may touch the wire with one of his ears or with the back of his neck, and electrocution will be immediate if his feet are on metal. Besides, the car may be wet. Mine cars usually are wet, at least on the bottom. Water is not a good conductor, but it is a better conductor than dry wood, and the wet path will prove to be good enough to provide an electrocuting current, especially as it will be only a short way from the man's foot to the drawbar or a car brace. Accidents do not always happen when the set-up is in every way favorable for an accident; a single weak spot may serve as the causative agent.

Q.—What is meant by 100-percent humidity?

A.—When air contains all the moisture it can retain it is said to be 100 percent humid. Thus, at 90 deg. F., 100,000 cu.ft. of air will hold 25.439 gal. of moisture. Any more moisture added to those gallons would promptly tumble out as dew. If

the temperature is lowered to 62 deg. F., about the temperature of a mine of ordinary depth, the air will hold only 10.525 gal. and in being cooled to that temperature would drop $25.439 - 10.525 = 14.914$ gal.

Then, when a mine intakes 100,000 cu.ft. per minute at 90 deg. F. and lowers the temperature of the air to 62 deg. it will cause 14.914 gal. to be deposited on the roof, ribs and floor every minute. If the air received by the mine had only 10.525 gal. per 100,000 cu.ft. at 90 deg. F. it would have only $\frac{10.525}{25.439} = 0.4137$ as much water as the air would take, and would therefore be only 41.37 percent saturated. Cooling the air brings it rapidly nearer to saturation, if it is not already saturated.

It is interesting to note that 25.439 gal. is 5,876.409 cu.in., the cube root of which figure is almost exactly 18, so 100,000 cu.ft. of air at 90 deg. F. will contain enough water to fill a cubical vessel with 18-in. sides. The water would cover a standard 16½x22½-in. city newspaper with water 15.8 in. deep. As 100,000 cu.ft. of air per minute is a usual discharge for a fan, it is easy to see that the quantity of water thus carried is quite large if the air is saturated. Of this, 9.3 in. of water would be released when the temperature dropped to 62 deg. F., which is the mine temperature. Because air absorbs so much water explains why moist air is so light, for water vapor is lighter than air.

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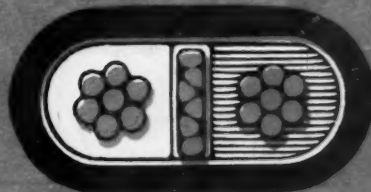
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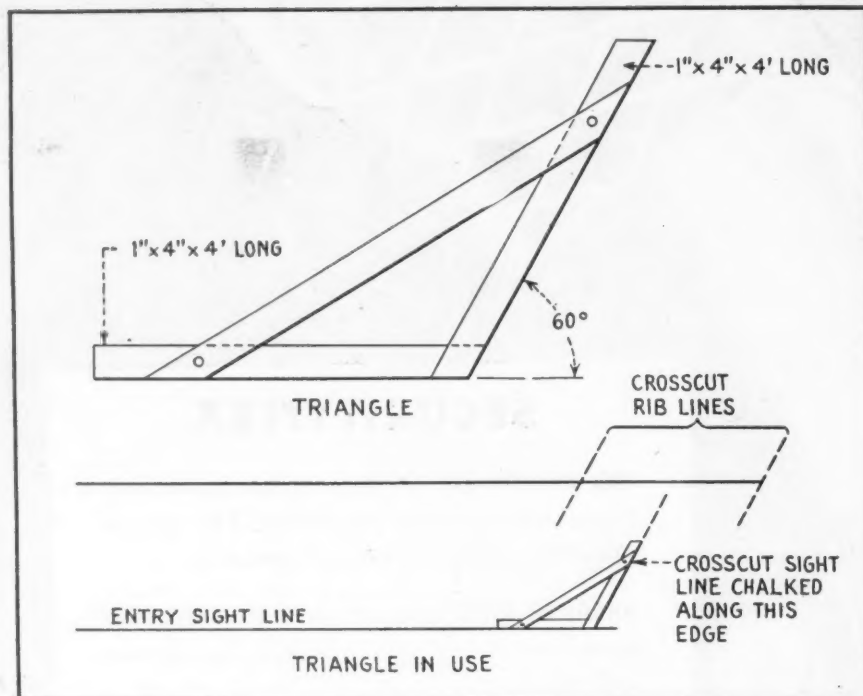


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Operating Ideas

Wooden Triangle Saves Transit Work



TO FACILITATE THE TURNING of crosscuts on definite angles without the necessity of setting sights with the transit a wooden triangle is used at the Oliver Coal Co., Somerset, Colo.

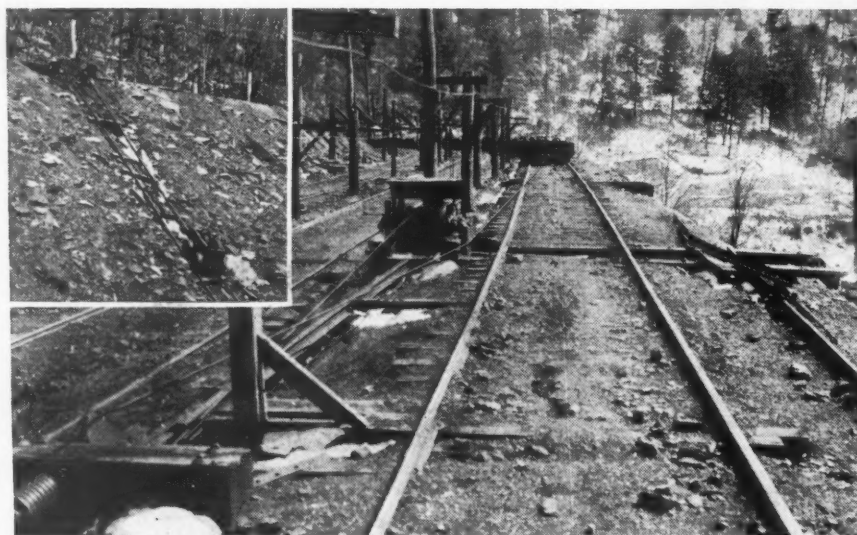
The triangle, shown in the accompanying illustration, is constructed of 1x4-in. boards 4 ft. long rigidly bolted together on the desired angle, which at this operation usually is 60 deg.

Wherever a crosscut is to be driven two sight marks (slightly less than 4 ft. apart) are established in the entry. One side of the triangle is held against the two sight marks while along the other side of the triangle a heavy line is chalked on the roof. The crosscut is driven by taking sights, every cut, along this line.

Use of this device, according to Ronald Oliver, general superintendent, enables the mine foreman and section foreman to predict with a high degree of accuracy where a crosscut will intersect a parallel entry.

How a triangle for turning crosscuts is made and used.

Trip Retarder Counterweight Runs on Hillside



Retarder paying out rope feeding the loaded trip downgrade to the tippie, which is just around the curve. That opening between the ties (to the right) accommodates the 1/4-in. rope to the counterweight on the side of the fill. Insert: Loaded trips gravitating to the tippie pull this weighted car up the hill. On its descent it rewinds the main rope.

FEEDING TRIPS of mine cars down the 1-percent grade of the loaded track to the tippie at the Arista (W. Va.) operation of the Weyanoke Coal & Coke Co. is done with little labor, in a safe manner and with efficiency and accuracy by a trip retarder built in the mine shop.

The hoist drum (see yard illustration) is installed near the upper end of the yard with a spring-anchored head sheave about 50 ft. upgrade. The hoist drum spools enough 3/4-in. 6x19 rope to allow a travel of 350 ft. The spring-set brake is released by a hand pull on a small wire rope strung through pulleys mounted on the trolley posts. This control wire extends to the tippie.

The counterweight, consisting of a small narrow-gage car weighted with scrap iron, runs up and down a track on the side of the mine-yard fill. From a second drum geared to the main drum of the hoist a 1/2-in. 6x37 rope connects with the counterweight car through double-block pulleys. The transmission ratio is such that 60 ft. of travel of the counterweight pulls the main rope 350 ft.

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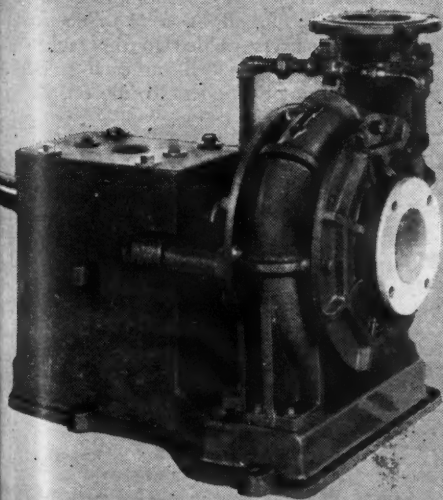
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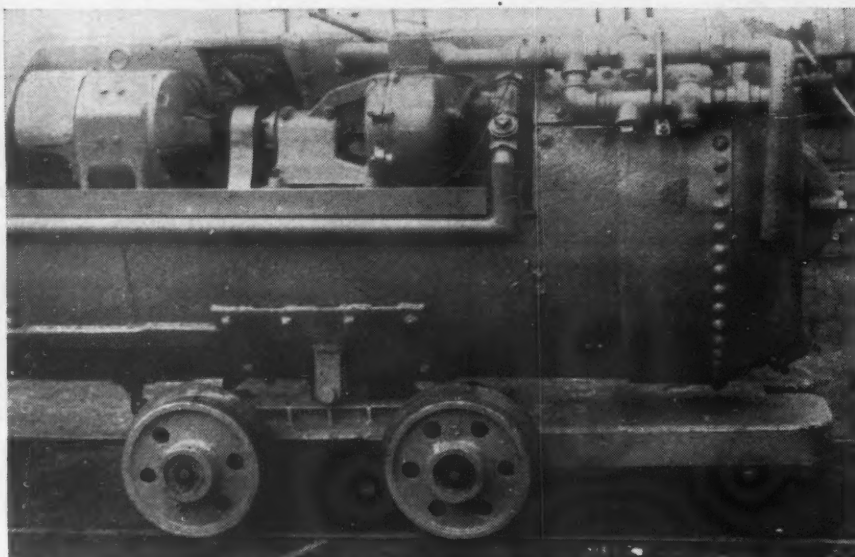
The illustration shows a solution to the problem facing all operators of Tipples and Breakers through the use of Hydroseal Pumps and other Allen-Sherman-Hoff Co. equipment.

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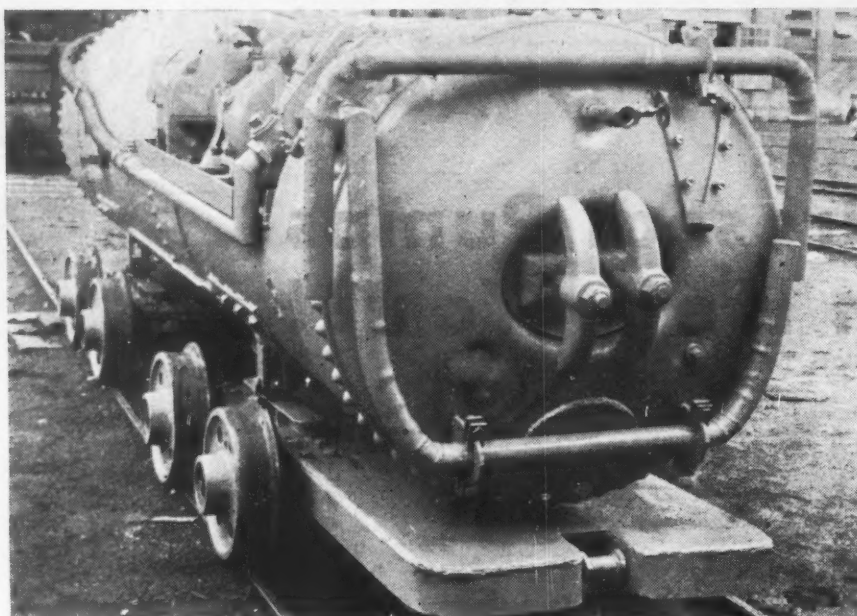
THE ALLEN-SHERMAN-HOFF CO., 231 S. 15th Street, Philadelphia 2, Pa.

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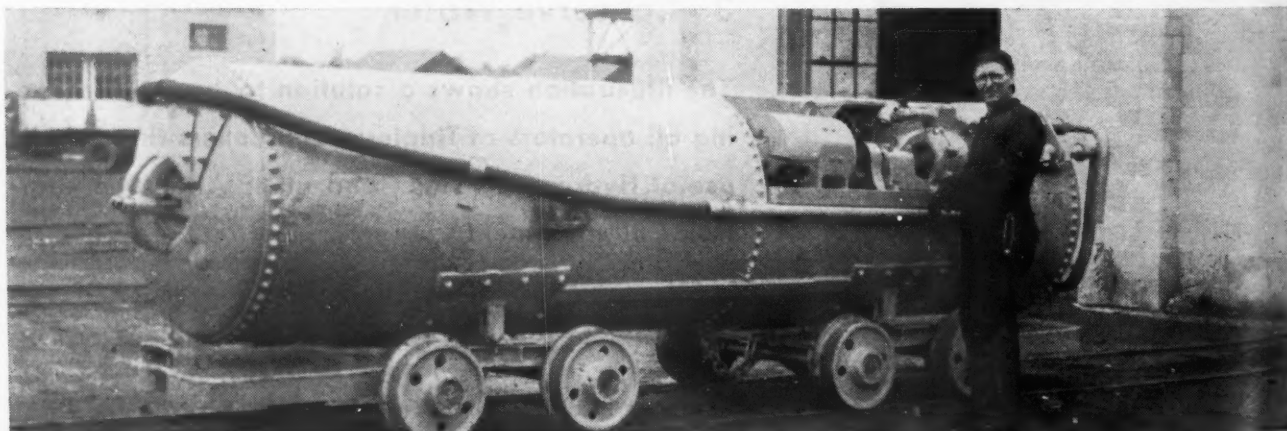
Power-Driven Sprayer Used on Haulage Roads



Close-up of pumping unit.



Rear end of tank car. Upper half of heading, roof and ribs are sprayed from one U-shaped pipe. Lower half of the heading is sprayed from the other.



Side view of tank car showing pumping unit and filling hose.

THE FREEMAN COAL MINING CORP., Her-
rin, Ill., has just put into service the 1,000-
gal. track-mounted water sprayer shown
in the accompanying illustration. It is
coupled behind a locomotive for use on
haulage routes to allay dust. Power to
drive the 250-volt pump motor is by cable
connection to the locomotive. A hose is
permanently attached to the pump suc-
tion for use in filling the tank from sumps
or taps in the mine-pump discharge lines.
This tank car was built in the mine shop.

The tank has a diameter of 42 in. and
is 16 ft. long over the heads. A section of
the circular shell was cut out and replaced
by horizontal and vertical flat plates to
provide a recess with a level bottom on
which the pumping unit is mounted. That
unit consists of a Gorman-Rupp self-prim-
ing centrifugal pump driven by a 1,150-
r.p.m. General Electric 250-volt d.c. mo-
tor. A tee connection on the suction side
of the pump provides for taking water
from various sources to fill the tank. The
discharge may be directed into the tank
to fill it or it may be sent into the per-
forated spray pipes.

Two spray lines are provided. One
covers the lower half of the entry and the
other the upper half. Each perforated
pipe is U shaped, as shown in another
illustration. The pump has capacity to
supply one set of sprays, but not both at
the same time. Water is directed to the
desired sprays by a set of plug valves. A
tank of water is good for a 15-minute run,
spraying at a rate of 70 g.p.m.

Both ends of the tank carry a "V" (for
Victory) frame on each of which are
mounted seven red and green "cat eyes"
to warn pedestrians and trainmen.

Each pair of trucks is built up with
standard pit-car wheels and axles fitted
with Timken roller bearings. Wheels are
16 in. in diameter. The king pins are $3\frac{1}{2}$
in. Each fits into the inner race of a
thrust-type ball bearing that carries the
weight of the tank and permits the trucks
to take curves with ease. Side rocking of
the tank is limited by four rollers with
carrying brackets welded to the tank. A
flat surface is provided on each side of
each truck for the rollers to ride on.

We build all

Material Handling Buckets

4



ALL
PURPOSE

- SHOVEL
- PULLSHOVEL
- DRAGLINE
- CLAMSHELL

See your shovel engineer or equipment dealer about PMCO shovels and buckets.

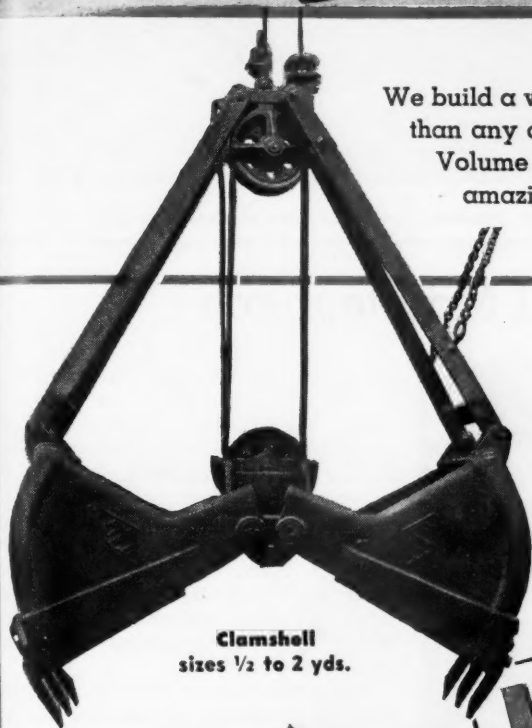
AMERICA'S MOST

COMPLETE LINE OF MATERIAL HANDLING BUCKETS

We build a wider and more complete line of material handling buckets than any other manufacturer.

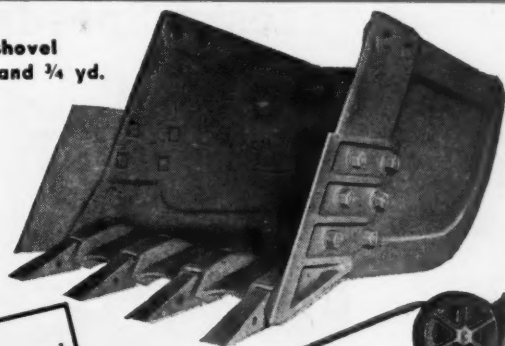
Volume production methods enable us to build a better bucket with amazing economies in manufacturing.

... Experience Counts ...



Clamshell
sizes 1/2 to 2 yds.

Pullshovel
sizes 1/2 and 3/4 yd.



● On the 1/2 yd. and 3/4 yd. sizes of Shovel, Pullshovel, and Dragline Buckets, all teeth are interchangeable ... a great convenience to operators.



Shovel
sizes 1/2 to 18 yds.

Dragline
sizes 1/2, 3/4, 1, 1 1/2, 2, 2 1/2 yds.



WE OPERATE THE LARGEST AND MOST COMPLETE MANGANESE STEEL FOUNDRY IN THE UNITED STATES

Quality Since 1880



PETTIBONE MULLIKEN CORPORATION

4700 West Division Street, Chicago 51, Illinois

Welding Bead Helps Retarder to Function

ADDING A WELDING BEAD to the surface of a squeezer-type car retarder, says Ronald C. Oliver, general superintendent of The Oliver Coal Co., Somerset, Colo., was all that was needed to make the retarder perform perfectly.

The retarder, shown in the accompanying illustrations, is located in the shed where coal is dumped, one car at a time, into a hopper which feeds the belt to the tippie. Trouble was experienced with the retarder in that its adjustment was

difficult to maintain. The pressure exerted against the flange of the car wheel was either too little or too much. The adding of an arc welded bead to this pressure-applying surface in the form of a wave cured the whole trouble.



The car retarder is located just ahead of the car scale.



The car retarder is released from a lever near the car scale.

Tester Speeds Electrical Maintenance



Mechanic tests a controller part with the electron insulation tester.

AN ELECTRONIC-TYPE INSULATION tester in use at The Oliver Coal Co., Somerset, Colo., has simplified the testing of electrical apparatus in their underground shop.

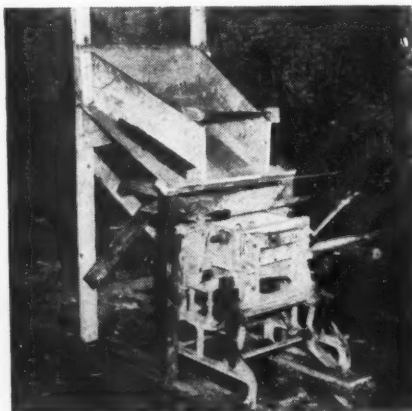
The self-contained tester, shown in the accompanying illustration, makes the checking of spare parts before their installation a simple operation. Since the meter does not depend on any outside source of power for its operation the mechanic only needs to make two connections, flip a switch, and read the meter to test the part in question.

This instrument is playing an important part by heading off electrical troubles, especially in connection with the face equipment which operates on 440 volts a.c.

Blocks Season Better Underground

MOVING THE BLOCK-MAKING EQUIPMENT inside the mine, says Ronald C. Oliver, general superintendent of The Oliver Coal Co., Somerset, Colo., has greatly improved the quality of the blocks available for building permanent stoppings.

The block machine, shown in the accompanying illustration, is located back of the underground shop well inside the mine where the temperature is about the same and where it is convenient to make blocks winter or summer. This location has another important advantage: after the blocks are finished, it is not necessary to keep sprinkling water on them to prevent their drying out too rapidly. The blocks cure very slowly without the addition of water and, therefore, make better blocks. These blocks are used in all permanent stoppings and overcasts.



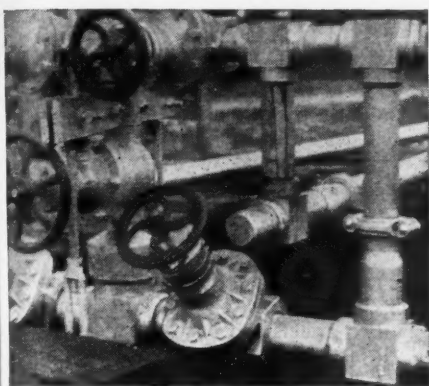
Concrete block-making equipment was placed inside mine to permit slow curing.

Profit

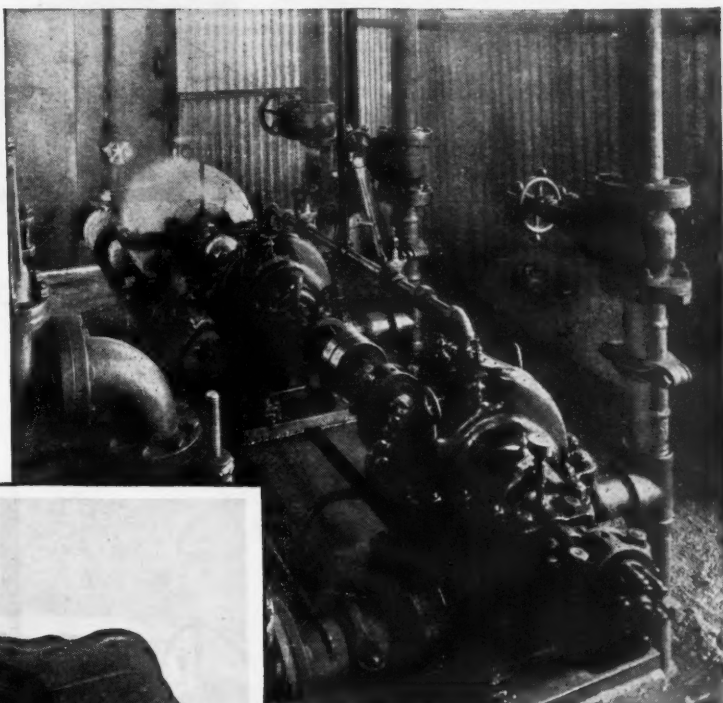
Those who would be guided by the adage, "Be not the first by whom the new is tried, nor yet the last to lay the old aside," can profit, we feel, by following this section closely. When you see it here, let it be a signal that it has been tested. Which reminds us—we pass out cash to those whose mechanical, electrical, operating or safety ideas are accepted. Upon publication, Coal Age will pay you \$5 or more for each.

Climax Flexible Lock Coupling ABSORBS VIBRATION

...protects valve and instrument settings. Prevents leaky connections in piping installations!



■ Climax Coupling on high pressure line. Compare leak-proof performance of coupling with leaky drop forge fitting at left.



■ Piping and valves in this pump installation are effectively "insulated" from vibration by flexible, leak-proof Climax Couplings. Also, valve may be disassembled from line by removing bolts from ONLY ONE flange. Exclusive design features make Climax Couplings 100% satisfactory in service with steam, water, air, gasoline, kerosene, oil or gas up to 1000 lb. working pressure.



ABSORBING VIBRATION from engines, pumps and compressors is but one of innumerable industrial applications in which Climax Flexible Lock Couplings have proved their superiority.

On high pressure lines—on all piping installations, above and under ground or under water, indoors or outdoors—wherever piping is subject to expansion or contraction from changing temperatures—wherever settling of tanks or vessels or other causes of line deflection may occur—wherever hammering may be set up by rapid opening or closing of valves—the flexibility of this coupling not only absorbs the vibra-

tions and allows for deflection (up to 5 degrees at each coupled point), but also provides a positive permanent pressure and vacuum tight seal more enduring than the pipe itself.

With Climax Couplings, costly threaded pipe and fittings are eliminated. Connecting-up and disassembly are easy and quick. Money is saved on installations, labor

—on material, maintenance and replacement expense.

FOR COMPLETE DETAILS write for Bulletin No.130. McAlear Manufacturing Co., Automatic Control Division of Climax Industries, 47 N. Cincinnati St., Tulsa, Okla.

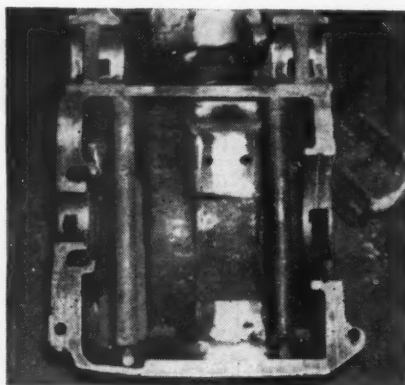


Braces Minimize Casting Warpage During Welding

BRACES INSERTED in locomotive-motor magnet-frame halves prior to any welding operation have been found to lessen materially the extent of the final machining operation on such frames at the Drifton shop of The Lehigh Valley Coal Co., Drifton, Pa.

After the motor is torn down and the magnet-frame halves, shown in the accompanying illustration, are cleaned they are checked for worn surfaces. Braces are inserted to prevent shrinkage and warpage of the frame if the semicircular surfaces, for the frame heads and axles, need to be built up.

As the welding heat expands the magnet



frame the braces are tapped farther in. Experience has taught the welder how much to move the braces.

After the magnet frame has cooled, says William Baskin, assistant superintendent of the shop, a slight amount of peening makes up for the small amount of contraction which took place in the casting.

At least four braces are used to each half of the magnet frame to help it retain its shape.

Double Drill Unit Mounted on Tractor

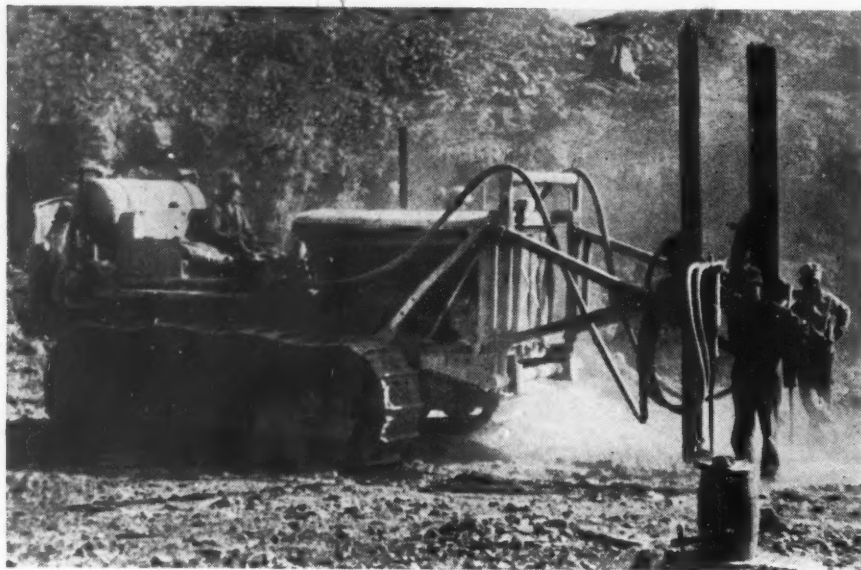
FOR DRILLING THE INTERVAL between the two seams being recovered and for other drilling purposes, Pond River Collieries, a division of the Mauger Construction

Co., Madisonville, Ky., uses twin air drills mounted on a crawler tractor. In this pit the removal of one seam by the dragline uncovers the limestone over the second.

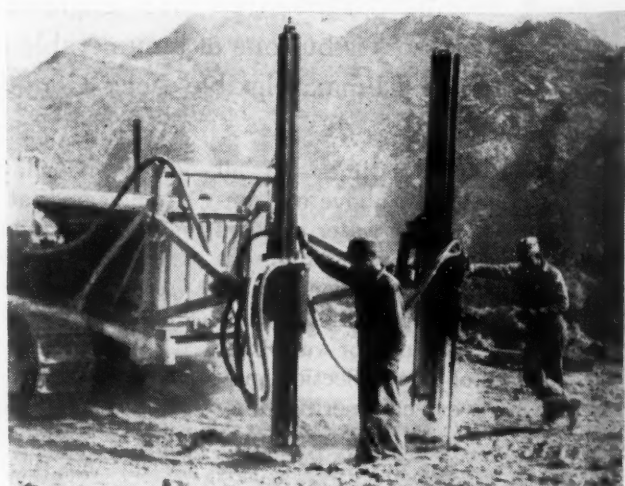
The drilling rig consists of two Cleveland air drifters mounted on slabbacks, each on a radially swinging arm attached to the front end of a tractor. An air-compressing unit is mounted behind the driver's seat. This unit consists of a Sullivan V-type compressor, air tank, water tank and auto-type heat exchanger (radiator). The compressor is clutch connected for cutting in and out. The rig is manned by two drillers and one driver.

In action, after finishing drilling in one area, the tractor is driven perhaps a half mile to a newly uncovered area of rock. It travels at a good rate of speed. Arriving at the new area, the driver stops the tractor and starts the air compressor, the drillers dismount, swing the drills into place and start to work. When the first holes are finished, the tractor moves to the next location and the drills get going almost instantly. Shooting with dynamite and an electric shotfiring machine finishes the area and the crew is off for another job.

The air compressor supplying the drills is mounted behind the tractor driver's seat.

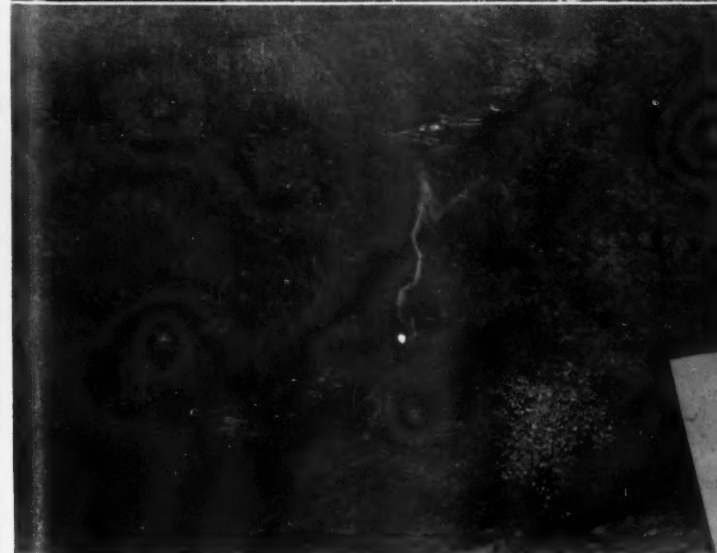


Side view of drilling unit with crew in working places.



Close-up of the drilling operation.

GOING 'ROUND THE MOUNTAIN ON TIMKEN BEARINGS



The Imperial Colliery Company's new mine at Burnwell, West Virginia, uses practically every type of modern mechanical transportation, including Timken Bearing Equipped mine cars.

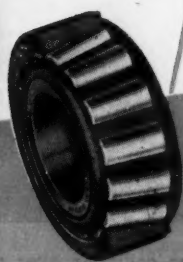
A belt conveyor system brings the coal out of the mine, where it is loaded into the large A.C. & F. Timken Bearing Equipped drop-bottom cars shown in photograph No. 1.

These cars haul coal around the mountain to the point shown in photograph No. 2, where it is dumped into a bin.

From this bin the coal is loaded into the Timken Bearing Equipped buckets of an Interstate Equipment Aerial Tramway and thus transported to the mine tippie, photograph No. 3.

When it came to selecting the drop-bottom cars for this operation, the Imperial Colliery Company did not hesitate. They specified "Timken Bearing Equipped"—and performance has proved their judgment sound.

Make sure you have Timken Tapered Roller Bearings in your new cars, belt conveyors and other equipment—and insist on seeing the trade-mark "TIMKEN" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio.

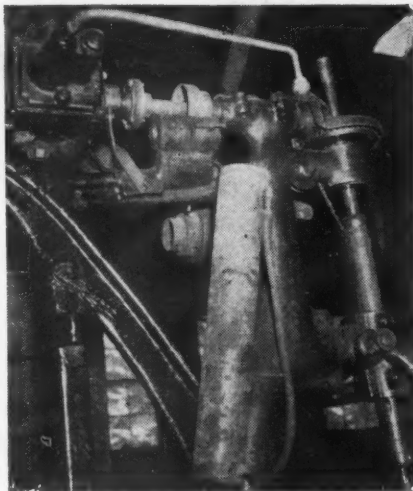


TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

Three Speeds and Cooling Added to Drill Press

AN EXAMPLE of improvement of old-type shop equipment to narrow the gap caused by the demands of new tools, better care of tools, new jobs and more efficient utilization of the time of mechanics, is indicated by the accompanying illustration of a drill press in the Arista (W. Va.) shop of the Weyanoke Coal & Coke Co.

To convert the drill press to a three-speed machine an automobile transmission was installed in the horizontal shaft at the top. The shift lever was re-formed to bring the knob to a position convenient for the operator. In place of the old-fashioned oil can and to forestall too-frequent neglect in allowing drills to become overheated, the cooling "system" was installed. It is simple yet effective. This "system," hanging in the foreground, consists of an open-top tank made from a



piece of 4-in. pipe 24 in. long. By means of the flexible hose and nozzle (the latter shown hooked to the top of the tank) the drill operator applies cooling liquid as required. Plain water is now being used. For refilling, the tank is unhooked and carried to the water spigot.

Shift handle and cooler nozzle handy to operator.

Pins Hold Split Gears Central—Save Planing



How the rim appears when the finished joint is pulled together.

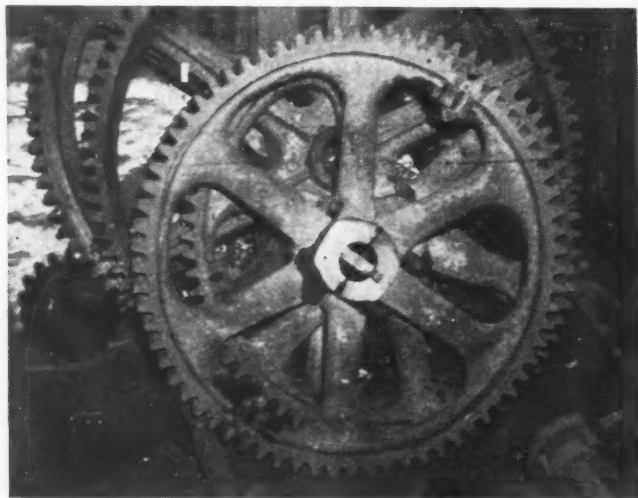
"THE GENERAL PRACTICE in making large split gears, sprockets, pulleys and other wheels is to cast each half separate and then machine the joints. For rough or unfinished split wheels, however, The Lehigh Valley Coal Co. shops at Drifton, Pa., abandoned this practice years ago and use the pin point for the two reasons." These, according to Johnstone Campbell, shop superintendent, are:

"First, planing is expensive.

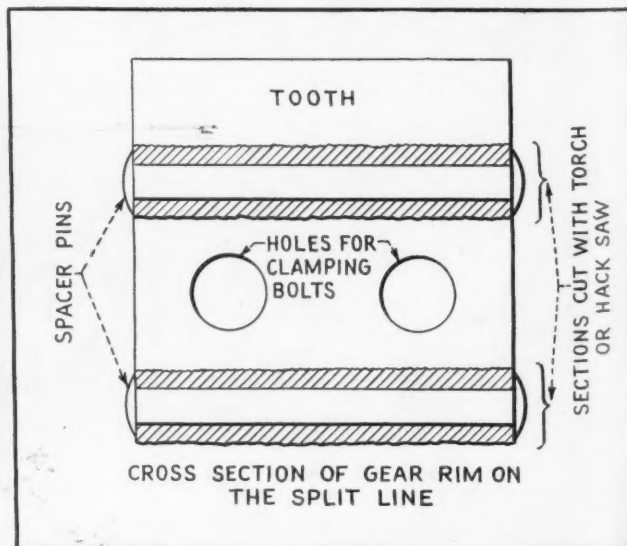
"Second, by using the pin method all castings are cast in one piece, which eliminates the shrinkage of the half-size castings and keeps the pitch line true in gears when in service.

"The casting is set up on the boring mill and rough bored to within $\frac{1}{8}$ in. of the shaft size. It is then taken to the drill press and $\frac{3}{8}$ -in. holes are drilled in the rim lugs on each side. In the larger type wheels four 1-in. pins sometimes are used, one on

each side of the lug bolts. Then the wheels are hacksawed for splitting. Thin cores were placed in the mold before casting so that the amount of hack-sawing would be reduced to a minimum (steel castings are split with the oxygen torch). Pins are machined to size from iron or steel scraps, leaving a thin head on each end. Pins then are placed in the drilled holes and the halves are bolted together for finishing. This splitting releases any excess expansion in the casting. Now the wheel is bored to correct size and the keyway cut, after which the casting is shipped to the colliery. Out of thousands of castings of this type, we do not recall a single failure. We wanted the colliery men to rivet the pin so that it would not come out if the bolts became loose, but they did not always do it. The small heads on the pins cured that. This is a very old idea, but not often practiced. We like it."



Gears are ready for consignment to the collieries after casting in one piece and installation of pin joints.



Pins have heads on both ends to prevent their working out.



Baker hydraulic Bulldozer on Allis-Chalmers Tractor owned by W. G. Moore & Son, shown making a cut for prospecting in the Clearfield County (Pa.) fields.

Ideal for "Prospecting"! Baker Hydraulic Bulldozers

The Baker hydraulic Bulldozer is a prime tool for prospecting according to reports of operators. It quickly moves the cover down to the various seams to be worked, and speeds the determining of the best stripping procedure to follow.

After the project is laid out, as a result of the prospecting, the Baker builds roads to the new mine, aids in the stripping, levels slack and overburden where necessary, digs sumps, cleans off the top of the vein to ready it for shooting and loading, and helps speed shovel loading. No strip mining equipment so quickly and so repeatedly returns its cost.

Because of their direct hydraulic lift and full down pressure on the blade (Baker hydraulics do not depend on weight of blade and gravity alone to force blade into a cut) Baker hydraulics are the number one bulldozer in all strip mining fields. Ask your Allis-Chalmers tractor dealer, or send for copy of Catalog 839.



A Baker strips overburden at Ryan Brothers mine in the Clearfield district, Illinois. Indiana, Ohio and West Virginia strippers prefer Bakers too.

BAKER
They Go Together
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THE BAKER MANUFACTURING CO., 514 STANFORD AVE., SPRINGFIELD, ILL.



BOSS ... the men swear by Cincinnati Chains and Bits ... they're trouble-free!

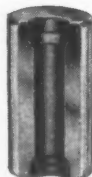
GEORGE ... they're being used everywhere ... sorry we didn't start using them sooner ... they save man hours and cut operating costs, too!



Long life, replaceable, hardened alloy steel Connector Insert gives new factory joint accuracy to a worn connector.



Easily removed heat treated Rivet holds Bearing Pin against longitudinal displacement.



Hardened Eccentric Pin is designed so it can't turn in block ... puts joint wear between pin and insert.



**CINCINNATI
DUPLEX CHAIN**

DUPLEX BIT

CINCINNATI
MINE MACHINERY CO.
2983 SPRING GROVE AVE.
CINCINNATI, OHIO

IT'S the same story in mine after mine ... once they've tried Cincinnati Time Tested Duplex Chains and double ended reversible Bits. Boss and machine runners agree on the merits of Cincinnati Coal Cutting Equipment. The experience is always the same ... satisfied operators ... less power consumption ... greater tonnage ... less maintenance ... and a saving in valuable man hours. Cincinnati Chains are tough because they're made that way ... heat treated and drop forged ... made of high grade alloy steel ... and engineered to take wear and stress of tough production schedules.

News Round-Up



Coal Nationalization Planned by Britain

In his address opening Britain's new Parliament, Aug. 15, King George VI told the House of Commons: "A bill will be laid before you to nationalize the coal mining industry as part of a concerted plan for the coordination of the fuel and power industries. Legislation will be submitted to you to insure that, during the period of transition from war to peace, there are available such powers as are necessary to secure the right use of our commercial and industrial resources and the distribution at fair prices of essential supplies and services."

Emanuel Shinwell, Minister of Fuel and Power, and Will Lawther, president of the National Mine Workers' Union, met two days later to discuss ways of obtaining an extra 8,000,000 tons of coal, considered essential for the winter months if shortage and hardships are to be avoided. After the meeting Mr. Lawther said that the districts were to be asked for practical suggestions to achieve the needed output.

A statement issued by the union acclaiming the prospect of nationalization of the industry in the future and calling for short-term cooperation immediately also stressed the need for increased production. The statement said that production at present was insufficient to meet the essential needs of the country and that it seriously impeded any attempt of the new government to reestablish export trade.

In an address Aug. 18 at Blackpool, Mr. Shinwell warned coal-mine owners that they must cooperate with the government nationalization scheme or face trouble. Mr. Shinwell promised them fair treatment and no haggling over the cost of the mines, but he said that he expected fair play from them. He declared that many owners were progressive and would welcome reorganization of the industry. He demanded also that miners play fair and produce in the next six months the additional 8,000,000 tons of coal that the government was asking.

Less than two months after full peacetime lighting had been restored in Britain, the blackout seemed to be on its way back Aug. 22. In an effort to conserve the nation's low coal supplies, Mr. Shinwell ordered local authorities "as a general rule" to extinguish all street fixtures at midnight and not to light them earlier "than is absolutely necessary." The authorities also were requested to consider a reduction in the number of lights in side streets.

Describing the general fuel situation as pretty grim, Mr. Shinwell, speaking Aug. 25 at Cardiff, Wales, said British coal stocks are much lower than they were a year ago. Stocks now total 12,500,000 tons, he said, compared with 16,500,000 tons a year ago. When winter comes, he added, unless production is increased, the situation will be worse.

Gas industry stocks, he declared, are sufficient for less than three weeks; railways have only 1½ weeks' supply, compared to more than double that a year ago. For the householder, he stated, there will be very little reserve in the government dumps to fall back on this winter. "Last year we started the winter with 800,000 tons in government dumps throughout the country, but this year there will be only a quarter of this amount," he pointed out, "and last winter we only just managed to get through."

A concentrated effort to relieve the critical world coal shortage by supplying desperately needed mining machinery to

European nations capable of large coal production has been instituted by the United Nations Relief and Rehabilitation Administration, it was announced Aug. 23 by Roy F. Hendrickson, Acting Director General. Shipment of 1,200 tons of vital machinery to Poland, Yugoslavia and Czechoslovakia is scheduled for September, he said, as the first step in UNRRA's over-all coal-mining-repair program for Europe, which calls for a total of \$12,000,000 worth of machinery to replace the most essential equipment destroyed during the war.

Explaining that military demands in the past have greatly hampered UNRRA in its efforts to obtain mining machinery, Mr. Hendrickson said that with the return of peace UNRRA procurement officers are redoubling their efforts to obtain this equipment immediately.

"We are negotiating for the diversion of \$1,300,000 worth of machinery from Lend-Lease supplies," he continued. "We have already requested \$3,600,000 worth of



"O. I don't work here. I'm just passin' through so I can collect the 'portal-to-portal' pay."

machinery, about 80 percent of which would come from the United Kingdom. This comprises the bulk of our original program. The world coal shortage, however, has compelled us to raise our sights, and we hope to increase our program by \$6,000,000. This equipment is needed as soon as possible. If it is made available, we can go a long way in meeting the coal crisis."

The emergency replacement program for the coal mines in eastern Europe is in line with UNRRA's policy of supplying the liberated peoples of the world as quickly as possible with the tools of emergency production so that once again they may help themselves, Mr. Hendrickson said. Of the 1,200 tons of machinery to be sent to Europe this month, 700 tons will be shipped from the United Kingdom and 500 tons from the United States.

"UNRRA's program," said Mr. Hendrickson, "affects not only those countries that will receive the machinery but all of Europe as well. Increased production of coal in the three nations that have called upon UNRRA for machinery to take the coal from their mines will assist materially in solving the critical world coal shortage."

"Poland today reports that it is producing coal at the rate of about 45,000 tons a day. An increase to 60,000 tons a day is expected within a month or so, which would bring the production rate to about 18,000,000 tons a year. Poland, with adequate machinery to work the mines, including the Silesian mines now under her control, has a potential capacity of 100,000,000 tons a year. This production would leave an export balance, after meeting all of her own needs, of between 70,000,000 and 80,000,000 tons, sufficient to care for substantial industrial needs in central and northern Europe."

"In southeastern Europe, Yugoslavia is now reported to be producing about 100,000 tons per month, far less than her minimum needs of 3,000,000 tons per year. With additional machinery, Yugoslavia is certain she can raise her production to a point where she would be able to meet her own requirements and export 30,000 to 40,000 tons monthly. Her exports would be sufficient to meet the industrial needs of Greece, for whom UNRRA must now provide 26,000 tons monthly—18,000 tons coming from South Africa and 8,000 tons from the United States."

"Czechoslovakia's present minimum coal needs are 11,000,000 tons a year. With machinery to work her mines properly, she could attain her pre-war production of 30,000,000 tons, satisfy her own requirements, and even export several million tons."

"France has won the battle of the coming winter," said a statement issued Aug. 8 by Rene Pleven, French Minister of Finance. Coal production, he said, has reached 70 percent of normal; in the next four months, he added, France would receive 400,000 tons of coal monthly from the United States, and finally he stated that, in accordance with directives from the President of the United States that have been approved by the British Government, Germany would be obliged to supply many

millions of tons of coal to the countries of western Europe before satisfying her local requirements.

Categories of consumers assured of coal the coming winter, according to the Minister, include textile mills, shoe factories, sugar refineries, factories manufacturing building materials such as cement, bricks and steel girders.

Norwegian coal mines at King's Bay, Spitzbergen, will work full force this year, according to a statement Aug. 6 by Arne Broegger, managing director of the Great Norwegian Spitzbergen Co. He said that everything had been settled now despite great difficulties and two ships already were on their way north with machinery, building material, foodstuffs and personnel. Equipment has been purchased in Norway and Sweden.

Destruction by the Germans at Spitzbergen was so great that nothing remains of the old plants there and everything from houses to cutlery had to be replaced before the mines could resume. But now the first shipload of coal is expected in northern Norway this autumn. The prewar capacity of the Spitzbergen mines was roughly 100,000 tons annually, and next year's output is expected to be about that despite the difficult conditions.

Russellton Mine Wins First 'S' Award

Russellton (Pa.) mine of the Republic Steel Corp., in Allegheny County, Pennsylvania, is the first mine in the United States to win the "S" Award, presented by the National Safety Council. Formal presentation was made at the mine on Sunday, Aug. 19, at 2:30 p.m.

To be eligible for the N.S.C. award of honor for distinguished service to safety, an industrial unit must show a reduction

of 10 percent or more in the accident frequency and severity rate from the previous year and must maintain a lost-time accident record 50 percent or more below the average of the industry. Russellton captured the "S" award because it operated for 1,163,814 man-hours, or 338 days—from March 3, 1944, to April 9, 1945—without a lost-time accident. During that period the mine produced a total of 841,972 tons of coal.

Acting as chairman at the award ceremony, J. A. Cox, mine superintendent, accepted the "S" pennant and certificate from John Roche, director, industrial division, National Safety Council. Other speakers were R. H. Ferguson, manager of safety, Republic Steel Corp.; Garfield Thomas, Deputy Secretary, Pennsylvania Department of Mines; George S. McCaa, Pennsylvania State mine inspector; John Zahradnick, district board member, U.M.W.A.; George W. Grove, supervising engineer, U. S. Bureau of Mines; J. L. Hamilton, district manager, Northern coal mines, and E. B. Winning, assistant to vice president in charge of operations, Republic Steel Corp.

The "S" award and certificate have been presented to less than 100 industrial units in the United States. This is the third Republic unit to be so honored, the others being the Berger Manufacturing Division, Canton, and the Bolt and Nut Division, Cleveland.

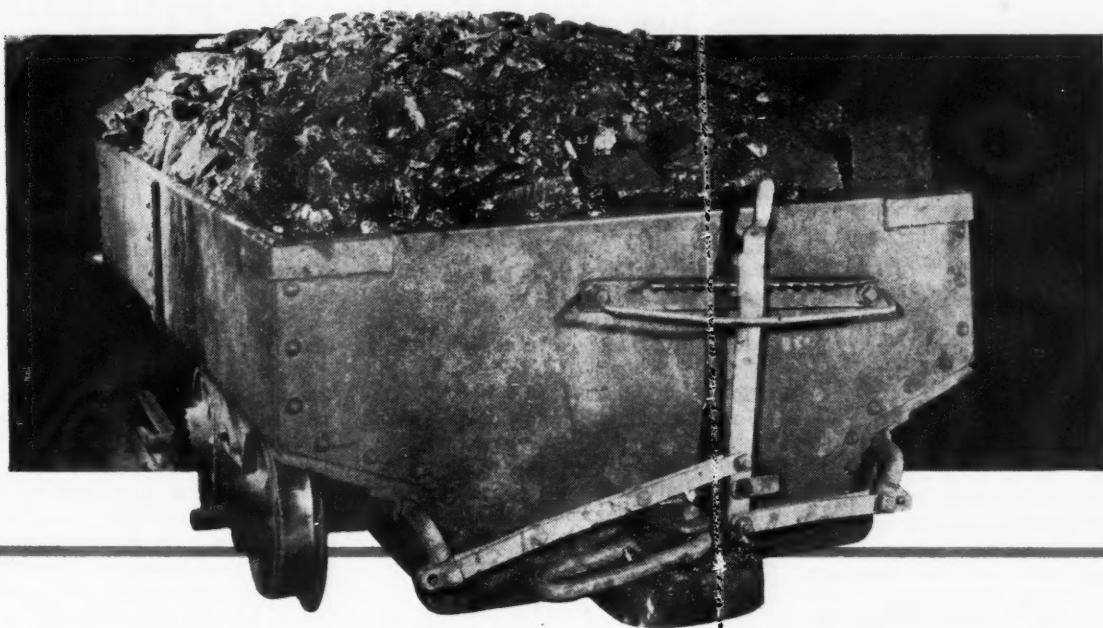
Frederick Mine Wins Governor's Cup

Frederick mine of the Colorado Fuel & Iron Corp., Valdez, Colo., captured first place in first aid at the contests held Aug. 3 and 4 at Denver, taking permanent possession of the Governor's cup. Shamrock mine of the Shamrock Coal Co., Erie,



Presentation of National Safety Council's distinguished safety award to Russellton No. 2 mine of Republic Steel Corp., Aug. 19. Speaking at the microphone to a crowd of more than 500 is George W. Grove, supervising engineer, U. S. Bureau of Mines.

DOES COR-TEN INCREASE MINE CAR LIFE?



Listen to This...

ABOUT four years ago, 100 cars, $2\frac{1}{2}$ -tons capacity and with sides and ends of $3/16$ -in. U·S·S COR-TEN, were put into service in a large Western Pennsylvania mine in which corrosive conditions are unusually severe.

Recent examination of these cars showed that they have already lasted twice as long as other cars in this mine of same size and similar construction, but made of copper steel. The COR-TEN cars are still in service. Indications are that they will last at least four times as long.

There are five good reasons why construction with U·S·S COR-TEN will make mine cars last longer:—

1. In the thicknesses commonly used for mine car construction, U·S·S COR-TEN has a minimum yield point of 50,000 lbs. per sq. in.— $1\frac{1}{2}$ times that of structural steel.
2. Its resistance to abrasion is greater.

3. Its endurance limit of 42,000 lbs. per sq. in. is 40% higher.
4. It has 60% greater resistance to impact.
5. And finally, U·S·S COR-TEN has 4 to 6 times greater resistance to atmospheric corrosion than plain steel—twice that of copper steel.

U·S·S COR-TEN's ability to outlast ordinary steel construction—to make mine cars stronger, tougher, more corrosion-resisting, able to carry bigger loads for a given over-all dimension,—and to keep weight and cost to a minimum, has been demonstrated in more than 10,000 mine cars now in service.

Our engineers will gladly discuss the economical application of this time-tested, high-strength steel to your requirements — whether you propose to build your cars stronger, or lighter, or to increase their capacity without increasing weight.



AMERICAN STEEL & WIRE COMPANY, Cleveland, Chicago, New York
 CARNEGIE-ILLINOIS STEEL CORPORATION, Pittsburgh and Chicago
 COLUMBIA STEEL COMPANY, San Francisco · NATIONAL TUBE COMPANY, Pittsburgh
 TENNESSEE COAL, IRON & RAILROAD COMPANY, Birmingham
 United States Steel Supply Company, Chicago, Warehouse Distributors
 United States Steel Export Company, New York

EVERY SUNDAY EVENING,
 United States Steel presents *The Theatre Guild on the Air*. American Broadcasting Company coast-to-coast network. Consult your newspaper for time and station.

UNITED STATES STEEL

was awarded the safety trophy for a perfect safety record for the first six months of 1945, working 69,000 man-hours without an accident.

Anthracite Company Trains Men for Work

To relieve the manpower shortage and bring younger men into the anthracite industry, the Lehigh Valley Coal Co., Wilkes-Barre, Pa., has started a training program for prospective mine workers. Applicants, who must be 18 years of age or older, will receive standard wages for the training period of 26 days, a total of \$225.25, and will be eligible for the \$75 vacation pay that regular employees receive.

The trainees will be put in Dorrance, Franklin, Prospect, Henry and Westmoreland collieries. Mine foremen and safety engineers will acquaint them with the routine and point out the worth of mining as a career. At the end of the course, each trainee will be eligible for the post of contract miner's helper. The War Manpower Commission and the U. S. Employment Service are cooperating with the company in the venture.

In Wyoming Valley alone, 8,700 mine workers are needed and the entire industry could absorb at least 12,000, according to estimates. The Wilkes-Barre office of the U. S. Employment Service reports 3,000 male applicants for work registered.

Coal Men Intervene In Ohio Gas Case

A joint petition to intervene in the Metropolitan Eastern Gas Corp. case before the Federal Power Commission has been filed by the National Coal Association and the United Mine Workers of America. The applicant seeks authority to construct and operate about 825 miles of 18-in. natural-gas transmission pipeline from the Carthage field of Texas to a point near Hamilton, Ohio. The project would cost \$23,500,000 and would bring into the Appalachian area 140,000,000 cu.ft. of gas per day, equivalent to about 7,000 tons of coal daily. Hearing on the application has been set for October.

Schuyler Coal Co. Sold

W. H. Moseley, president, Schuyler Coal Co., which has operated a strip mine north of Rushville, Ill., for the last four years, announced July 16 that he had sold the business, which will be operated hereafter as the Solar Mining Co. with these officers: president, Frank F. Kolbe; vice president in charge of sales, M. M. Soule; vice president in charge of operations, H. A. Reed; secretary-treasurer, A. E. Lamm. The coal will be sold by the United Electric Coal Cos., Chicago. Mr. Moseley said he had disposed of his business because of ill health.

Manpower Controls Lifted as War Ends, Oil Freed for Civilian Use

ALL MANPOWER CONTROLS over both employers and workers were abolished by the War Manpower Commission a few minutes after President Truman announced the Japanese surrender, Aug. 14. This applies to the 48-hour week, employment ceilings, priority referrals and all the remaining complicated network of industry and area controls built up during the war years. An immediate reduction also was ordered in draft calls, from 80,000 to 50,000 per month, and Selective Service notified all State directors to stop induction of registrants 26 years old or over. The lowered draft calls are aimed at providing "only sufficient men to support the forces required for occupational duty and permit the release of long-service men overseas to the maximum extent that transportation makes possible." In announcing the new draft program, President Truman

disclosed plans for stepping up the release of veterans, predicting that 5 to 5½ million men will be returned to civilian life in the next 12 to 18 months.

Two days later the President announced that he would call a conference of labor and industry representatives, to work out a new agreement to minimize labor disputes and production stoppages during reconversion. He referred to the war-time "no-strike" pledge, asking that it be renewed, and that both labor and industry continue to accept voluntarily the decisions and directives of the War Labor Board. It has been pointed out by Labor Department officials that disputes cannot now be certified to the Board, since it can no longer be held that they constitute a threat to war production.

Meanwhile, a heavy coal demand sufficient to utilize all the men available was expected for some months to come while the figure on exports to Europe this year was raised from 6,000,000 to 8,000,000 tons. This prognostication was made despite earlier word (Aug. 3) that Big Three decisions on German economy might eliminate need for this country to send 6,000,000 tons of coal to Europe this winter. It was believed that with the measures to be taken by the Allied Control Council in Berlin the Allies may be able to boost Ruhr production to provide liberated Europe with an estimated 25,000,000 tons of German coal, its minimum needs up to April 1.

Representatives of nine European governments, it was announced Aug. 11 by Acting Secretary of Interior Abe Fortas, have sent the United States Government a formal expression of gratitude upon learning that this country would endeavor to send 6,000,000 tons of coal to relieve suffering in devastated Europe this winter. The message, sent to the American representative on the European Coal Organization by the agency's Council of Organization, read:

"It was the unanimous and warmly expressed desire of the Council that you be kind enough to telegraph Washington the sincere thanks of all the member governments for this further most timely, practical and generous assistance from the government of your country toward Europe."

Represented in the European Coal Organization are the governments of Great Britain, France, Norway, Denmark, Belgium, the Netherlands, Greece, Luxembourg and Turkey.

In a State Department radio broadcast Aug. 11 on foreign policy, Joseph C. Grew, Undersecretary of State, said: "The whole European economy is starved for coal. Europe needs 30,000,000 tons of coal this winter, not for fuel in their homes. They need it first of all for transportation and industry."

Government agencies moved quickly to release oil following the Japanese surrender after earlier warnings against reconversion from coal. Deputy Petroleum Adminis-

COAL ACTIVITY

Bituminous Coal Stocks

	Thousands	Net Tons	From June 1945	P.c. Change—From June 1944
Electric power utilities..	13,736	5,128	+8.8	-16.5
Byproduct coke ovens..	5,128	703	+15.8	-16.6
Steel and rolling mills..	703	9,875	+3.2	-10.4
Railroads (Class I)....	9,875	13,713	+5.4	-25.9
Other industrials*.....	13,713		-5.9	-22.4
Total.....	43,155		+7.7	-20.5

Bituminous Coal Consumption

	Thousands	Net Tons	From June 1945	P.c. Change—From June 1944
Electric power utilities..	5,970	7,343	-0.2	-3.1
Byproduct coke ovens..	7,343	762	-6.7	-5.6
Steel and rolling mills..	762	10,068	-11.3	-2.1
Railroads (Class I)....	10,068	10,909	-5.8	-1.5
Other industrials*.....	10,909		-7.8	+5.4
Total.....	35,052		-5.9	-0.6

*Includes beehive coke ovens, manufactured-gas plants and cement mills.

Bituminous Production

July, 1945, net tons.....	47,460,000
P.c. change from July, 1944.....	-3.1
January-July, 1945, net tons.....	343,890,000
P.c. change from Jan.-July, 1944..	-6.7

Anthracite Production

July, 1945, net tons.....	4,908,000
P.c. change from July, 1944.....	+0.6
January-July, 1945, net tons.....	31,585,000
P.c. change from Jan.-July, 1944..	-16.2

Sales, Domestic Stokers Vs. Oil Burners

	Stokers	Burners
June, 1945.....	8,508	8,992
P.c. change from June, 1944.....	+167.8	+202.1
January-June, 1945.....	38,264	37,223
P.c. change from Jan.-June, 1944.....	+210.2	+155.1

Index of Business Activity*

Week ended Aug. 25, 1945.....	188.0
Month earlier.....	214.0
Year earlier.....	233.1

*Business Week, Sept. 1.

Electric Power Output†

Week ended Aug. 25, 1945, kw.-hr. 4,116,049,000	
P.c. change from month earlier..	-7.2
P.c. change from year earlier....	-6.8

†Edison Electric Institute.

NEW...FULL-TIME OPERATING EFFICIENCY

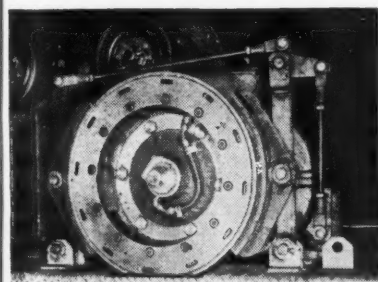
with FAWICK CLUTCHES



The newest improved type of shovel is Fawick equipped—for more dependable, more economical operation.

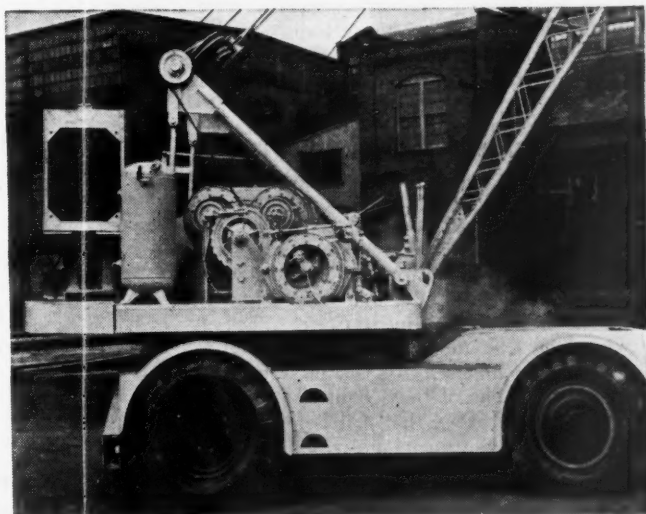
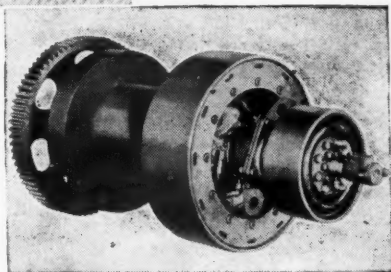


Fawick Clutches are providing new efficiency for shovels, cranes, draglines and hoists.



Main propel mechanism of the Shovel above—Fawick equipped.

Hoist drum assembly of the Shovel above—Fawick equipped.



Seven Fawick Clutches are used on the new Byers 1/2 cu. yd. "Traveler".



FAWICK *Airflex* CLUTCH

FAWICK AIRFLEX CO., INC. • 9919 Clinton Road, Cleveland 11, Ohio

In Canada, Reynold-Coventry Ltd., Montreal, Toronto, Vancouver • In Britain, Crafts Engineers, Ltd., Bradford, England

trator Ralph K. Davies stated Aug. 17 that, "in keeping with Administrator Ickes' oft repeated assurance, the Petroleum Administration for War will commence immediately the liquidating of its affairs with a view to closing the agency at the earliest possible date." He said that existing wartime controls would be withdrawn as rapidly as possible in the production, refining, transportation and marketing branches and the oil industry freed to operate upon a normal peacetime basis. Previously, all restrictions had been removed from oil and gasoline use and oil-burner installations.

Asked for an estimate of the number of oil burners that will be installed during the coming fall and winter, in view of the release of fuel oil from rationing, Robert Gray, of Oil Heat, expressed the opinion that the shortage of certain materials such as castings, motors and controls is so serious that V-J Day cannot be expected to have a marked effect on production before Jan. 1, 1946. He estimated that a total of 130,000 burners will have been installed during the calendar year 1945, of which only 30,000 will be new oil users, the remainder being replacements of worn-out and obsolete units. Of these, about 60 percent will be in the Middle Atlantic States and New England. He further estimated that the first quarter of 1946 will see the production of 100,000 burners followed by maximum production according to the then current demand.

Increases in producers' ceiling prices for bituminous coal averaging 3.47c. per ton were announced Aug. 3 by OPA for 13 of the country's 22 districts. The increases, which followed industry protests, were made by OPA to provide each district with the standard operating margin of either 15c. a ton or the 1942 margin, whichever is greater. The advances range from 3 to 20c. per ton. The 20c. increase applies only in one district (Washington, Oregon and Alaska), producing 0.2 percent of the nation's coal. They are in addition to increases allowed May 1 to compensate producers in part for wage increases given miners. In nine districts no increases were granted because available data showed that previous adjustments were sufficient to equal the required margin. The OPA action was followed by sharp protests from District 8, one of those omitted.

The agency said that if it is found that additional adjustments are required in any district later they will be made promptly and that if any district makes a materially larger margin than the OES standard, prices will be reduced. Since the increases cannot generally be absorbed by coal dealers, they must be passed on to consumers.

An average increase in District 16 (northern Colorado) of 7.53c. per ton was granted by separate action. This increase is a result of redetermination of target margin, simplification of price schedule and apparent deficits below the former target margin. Redetermination of the target margin accounts for 2c. of the above increase.

Ceiling increases for producers, by districts and type of mine, in cents per net ton, follow:

District		Increase
1	Central Pennsylvania, Maryland, part of West Virginia. Deep	.10
1	Central Pennsylvania, Maryland, part of West Virginia. Strip	.10
2	Western Pennsylvania Deep	.06
2	Western Pennsylvania Prepared Strip	.06
3	Northern West Virginia Mine Run	.05
3	Northern West Virginia Other Sizes	.10
6	West Virginia Panhandle. All	.04
7	Part of West Virginia and part of Virginia. All	.04
10	Illinois (in lieu of and not in addition to those granted May 1) Hand	.20
	Size Group 1-8 Strip	.05
	S.G. 9-29 Strip	.10
	S.G. 1-8 Machine	.10
	S.G. 9-29 Machine	.15
11	Indiana All	.04
15	Missouri, Kansas, northern Oklahoma and Texas. Strip	.03
	Deep	.10
16	Northern Colorado All	.07
17	Southern Colorado and part of New Mexico. Hand	.05
18	California and part of New Mexico. All	.13
22	Montana All	.12
23	Washington, Oregon and Alaska. All	.20

Suppliers of bunker fuel at tidewater ports were granted increases ranging from 4 to 20c. a ton in their ceiling prices for coal produced in seven districts, OPA announced Aug. 13. The increases, effective that day, were granted to compensate bunker fuel suppliers for the higher prices they had to pay producers since Aug. 3, when ceilings were raised.

The seven districts affected are: Districts 1 (central Pennsylvania, Maryland and parts of West Virginia and Virginia) and 4 (Ohio), an increase of 10c. a ton; Districts 6 (West Virginia Panhandle) and 7 (parts of West Virginia and Virginia), an increase of 4c. a ton; District 23 (Washington and Oregon), an increase of 20c. a ton.

Solid Fuels Administrator Ickes announced Aug. 20 the revocation of SFAW

Regulation No. 30, which since July 1 has restricted shipments of reclaimed coke from the United States into Canada.

On Aug. 27, Mr. Ickes stated that, effective at once, SFAW would permit American coals to be sold commercially for export to Sweden, Portugal, Switzerland, Denmark and north Africa to the extent that they can be spared from essential needs in the United States and the liberated nations of Europe. However, all commercial shipments, he said, must be applied against the export allocations set up by the Foreign Economic Administration for distributing the 8,000,000 tons of American coals to be made available for use across the Atlantic in 1945. SFA must approve the sources of the coal before contracts can be made.

Distribution controls over plumbing,



UNIVERSITY OF KENTUCKY TO OPERATE PILOT PLANT.

Part of plant in Lexington where it is planned to produce smokeless coal by low-temperature carbonization, with such resultant byproducts as oils, explosives, lyes, chemicals and material for use in plastics, rubber, pharmaceuticals, etc. Research work is contemplated on all types of coal produced in Kentucky. Coal is unloaded from a railway spur at this elevator and bin and wheelbarrows cart the material a short distance to the building.

Investigate **TOURNAPULL** ECONOMIES FOR YOUR STRIP PIT OPERATIONS



THE equipment investment for a three-unit Super C Tournapull fleet, with snatch loading 113 HP crawler tractor equipped with dozer for road maintenance and heavy duty Rooter for breaking up shale, is less than half that for a shovel-truck combination of equal load and haul capacity. Four men per shift operate this complete Tournapull stripping outfit. With a dump boss and foreman you have a six-man crew.

Output capacity per eight hour shift at 85% operating efficiency (50 minute hour) on an average 1000 foot level one-way haul would be 3120 yards bank measure (see table below). Operating life of Tournapulls is usually figured at 10,000 hours . . . there are many units well over this figure.

Maintenance is exceptionally low . . . dual tire troubles are eliminated . . . there is none of the spring maintenance that runs up costs. Complicated waste motion (and wear) of shovel-to-truck loading is saved, there is no waiting at shovel . . . each Tournapull is a complete operating unit. Service and breakdown delays are localized to one unit . . . rest of fleet goes right on working.

OUTPUT FOR FLEET OF THREE TOURNAPULLS

50 minute hour operating efficiency. Level haul on good mine roads.
Loading average scraper material. Bank measure.

Length of haul (one way)	400'	600'	800'	1000'
Yds. per hour.	480	450	420	390
Yds. per 8 hours.	3,840	3,600	3,350	3,120
Yds. per 24 hours.	10,400	9,450	8,820	8,190

On 24 hour production, 3 hours allowed for maintenance.
For longer hauls, figure at 14 m.p.h.

See your LeTourneau distributor and let him arrange to have one of our field engineers study your open pit properties and suggest a layout for Tournapull operation with output and cost estimates.

This pit formerly worked by shovel was easily adapted to TOURNAPULL excavation. Super C Tournapulls are snatch loaded, usually in less than a minute, average 12 yards, bank measure, per trip.



Tournapulls work from the surface down, can uncover the coal in strips or sections, dump in off-seam areas, or in mined-out cuts.



Tournapulls travel on level road at top speed of 14.9 m.p.h. Big tires (5'6" diameter), powerful engine (150 h.p.), effective weight distribution for high traction, long wheelbase . . . provide fast cycles over mine roads, good hill climbing ability, beat trucks for all weather operation.

TOURNAPULL jobs in strip coal pits include: Initial stripping operations; rehandling of overburden; removing peaks and easing end loads for faster strip shovel overcasting; topping out boxcuts; leveling; drainage; road building and surfacing.

LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

heating and cooking equipment, established by Order L-79, have been removed through revocation of the order, WPB announced Aug. 17. Originally issued in April, 1942, L-79 was designed to conserve the limited supply of this equipment for the most essential needs. As most recently amended, it restricted the sale of furnaces, boilers, radiators and water heaters to rated orders and for necessary replacement. It also assigned AA-3 ratings to sellers to enable them to procure plumbing, heating and cooking equipment and repair parts for working inventories.

Increased production, distribution and

use of wood as fuel for residential heating was suggested Aug. 17 by the Consumer Fuels Division of the WPB's Office of Civilian Requirements as one way to relieve the nation's critical fuel shortages this winter. The end of the war will make little difference in requirements for fuel wood, which is the normal heating fuel in about 8,000,000 American homes, WPB said. Pre-war consumption was approximately 77,000,000 cords of wood per year. Residential fireplaces will be in greater use, supplementary to coal and oil-burning furnaces, the Office of Civilian Requirements said.

Shuttle-Car Operation and Manpower Among Blacksburg A.I.M.E. Themes

THAT SHUTTLE CARS can if necessary be operated in low coal under many unfavorable natural conditions was the gist of a paper by Roland C. Luther, president, Peerless Coal & Coke Co., Vivian, W. Va., at a local meeting, July 27 and 28, of the Central Appalachian Section of the A.I.M.E., Blacksburg and Mountain Lake, Va. Observations of limited tests on salts to allay dust on shuttle-car roadways were given by Edward Thomas, U. S. Bureau of Mines. G. R. Spindler, director School of Mines, West Virginia University, presented a paper on the value of mining short courses. C. J. Flippen, labor commissioner, Kanawha Coal Operators' Association, explained the scholarship plan of the Central Appalachian section.

"New Developments in Oil and Gas Drilling in Southern West Virginia" were described by Charles G. Krebs, consulting petroleum and natural gas engineer, Charleston. At a dinner, over which W. P. Tams, president, Gulf Smokeless Coal Co., presided as toastmaster, E. R. Burke, president, Southern Coal Producers' Association, talked on the Washington outlook and on the pros and cons of the unionization of supervisory employees. One session, Friday afternoon, was held in the mineral industries building at Virginia Polytechnic Institute and the other, on Saturday morning, at the Mountain Lake Hotel.

Local arrangements for the meeting were under the direction of C. I. Cothorn, head of the department of mining engineering, V.P.I., and the general chairman was E. R. Price, general superintendent, Inland Steel Co., Wheelwright, Ky., and chairman of the Central Appalachian Section. At the first session the chairman and vice chairman were J. A. Hagy, general superintendent, Jewell Ridge Coal Corp., and John Parker, superintendent, Inland Steel, Wheelwright. Mr. Price was chairman of the Saturday session and R. H. Morris, vice chairman. Mr. Morris, who is vice president in charge of operations, Gauley Mountain Coal Co., Ansted, W. Va., is a director of the A.I.M.E.

Peerless No. 4 mine, in which the shuttle cars work under particularly bad conditions in one section, is in the Pocahontas No. 4 seam. Mr. Luther described the conditions as follows: Seam height, 4 ft., in-

cluding three pronounced but thin partings; immediate roof, 29 in. of clod slate without strength; next 19 in. of firmer slate and finally, at a point sometimes 10 ft. above the coal, a main roof of broken shaly sandstone; bottom a fireclay which becomes difficult when wet. The work is above the No. 3 seam, which was robbed four to ten years previous. However, a 10- to 20-ft. sandstone stratum between has afforded some protection, but is cracked. Excessive water is encountered at the face and dripping from the roof causes discomfort.

Handling of rock with the shuttle cars, with as much as 1 ft. of muck or mud on the roadways, has made maintenance of the shuttle cars difficult. Positions of control equipment such as pushbuttons have been raised and sealing compound applied to protect the electrical equipment. An electrician is kept with the working crew and it is necessary to bring out all machinery frequently for complete rewirings. Loading

is done with a Joy 14BU and the cutting with a shortwall carried on a caterpillar truck. Mine-car capacity is 4.65 tons level full.

The loader and shuttle cars were not purchased for the bad conditions described. Other units of like equipment are working in other sections of the mine under conditions that are "good" in comparison. It happened that a main-entry projection encountered the unlooked-for conditions and had to be driven through. The existing equipment was put to the task.

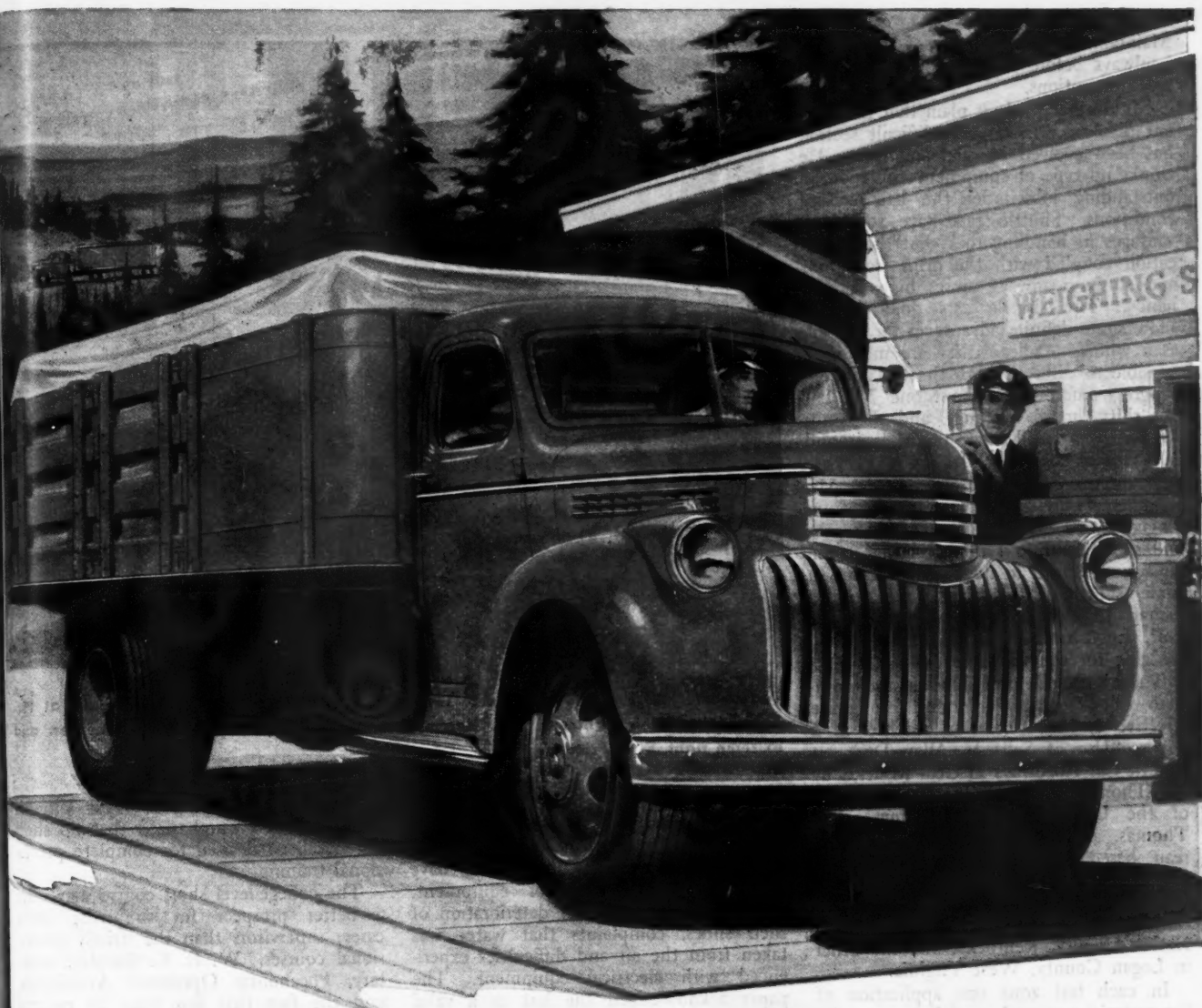
This entry consists of four headings with crosscuts at 60 deg. on 100-ft. centers. The bad roof requires that these crosscuts be staggered instead of driven in line. Top rock is regularly taken in the haulway, but in the aircourses only when it cannot be held. Locust or creosoted crossbars are used to timber all four headings. Often these collars sag so much that the shuttle-car haulway, normally on the second heading, must be changed to another heading.

Maximum shuttle-car haul is 440 ft. and the set-ups are spaced 200 ft. except that where top is exceptionally bad they can be spaced 100 ft. The haulway top rock handled by shuttle cars is for the most part loaded into mine cars. Gobbing inside of the mine has been tried, but any attempts to stack this rock higher than 2 ft. breaks shuttle-car-conveyor flights and causes other maintenance difficulties.

At times the bottom muck churned up by the shuttle cars is loaded out with the Joy machine. Concrete bridges over swags have been tried, but are too expensive. Wooden bridges get torn up by the traffic. Pumps are kept at all faces and a stabilizer is being tried for waterproofing the clay and keeping it packed. Results with the latter are not promising.



Grouped for the camera after the close of the session Saturday morning at Mountain Lake. Front row, left to right: J. A. Hagy, G. R. Spindler, Charles T. Holland, E. R. Price, R. H. Morris and George E. Keller



SERVICE BY THE TON

CHEVROLET

TRUCKS for

1945



Your truck is an important part of your service. The loads that it hauls keep you in business. Your trucking jobs demand equipment that will serve you satisfactorily and economically.

Low first cost, low operating cost and low maintenance cost are the main factors in successful truck operation.

Chevrolet trucks, with their built-in values, are the most economical to buy, to operate and to maintain. They are built for tough truck work. They are built to last longer. They will serve your business for thousands of ton-miles. For these reasons, truck users bought more Chevrolet trucks than any other make in seven of the last nine prewar years.

Your Chevrolet dealer can supply the right truck for your trade. He can increase the payload capacity, if you desire, by the installation of auxiliary axles, springs, bodies or trailers.

Buy only as much truck as you need. Buy a Chevrolet truck. It's payload, not chassis weight, that pays profits.

1 OUT OF EVERY 3 TRUCKS IS A CHEVROLET

Keep on Buying War Bonds

CHEVROLET MOTOR DIVISION, General Motors Corporation, DETROIT 2, MICHIGAN

Maintaining short hauls and changing haulways before ruts get deep are necessary precautions.

Mr. Luther made it plain that the present plan of working this difficult section has been evolved by trial and error. He thinks no type of equipment could do an outstanding job under the bad natural conditions. Shuttle cars have some advantages in handling rock, but that application coupled with the drips from roof and slushy roadways causes high maintenance. The shuttle cars do, however, show some definite advantages for the job as a whole. At least they are making it possible to drive through the bad section. Progress amounts to about one 7-ft. cut per shift for all headings, and the unit, worked by a small crew, produces around 100 tons of coal per shift.

In discussion of Mr. Luther's paper Mr. Spindler, who recently returned from England, said that because of shaft depths and other conditions mines in that country cannot afford to hoist much rock. In some shuttle-car operations they use a second Joy loader to stow rock to the roof. English mines use considerable wood bridging for shuttle-car roads.

That both calcium chloride and common salt (sodium chloride) are quite effective is the conclusion reached in a paper, "Use of Salts to Allay Dust on Shuttle-Car Roadways in Coal Mines," by Mr. Thomas and Dr. Irving Hartman, also of the U. S. Bureau of Mines. Mr. Thomas, a mine inspector with the Bureau, based his conclusions on visual observations and laboratory analyses of floor samples from 300-ft. test zones on shuttle-car haulways in two mines. One is in Harlan County, Kentucky, and the other in Logan County, West Virginia.

In each test zone one application of the material was made in flake or granular form, totaling 0.06 lb. per square foot of roadway. From observations and tests it was found that the range of absorbed moisture to effect consolidation of the road material was fairly wide. A range of $5\frac{1}{2}$ to 9 percent was mentioned but whether that was total moisture or just absorbed moisture was not caught for certain, but likely it was the former. Mr. Thomas mentioned that carrying away of the salts by wheels to untreated sections diminished the percentages of salts as time went on, which effect would not be true if the entire shuttle-car hauls had been treated. Also he suggested that application in liquid form might make it possible to get a more even distribution than with the dry salts.

Calcium chloride applied to a test zone included a wetting agent, but that fact was not discovered until after the test was made. It was a calcium-chloride preparation intended for tippie use. Laboratory tests of moisture-absorbing qualities of calcium chloride and sodium chloride indicated little difference but tests on the roadway samples seem to indicate that calcium chloride held the roadway moisture content to a higher percentage longer.

By visual observation it was noted that within one hour after applications of the salts there was much less dust in the air.



Toastmaster W. P. Tams introducing the evening speaker, E. R. Burke, who sits at Mr. Tams' left. At his right sits R. H. Morris. Extreme left of picture, W. E. E. Koepler, and extreme right, E. R. Price

The paper included an outline of the applications of salts for dust allaying in mines during past years and mentioned that some of the discontinuances have been due to corrosion of equipment, workers complaining over deterioration of their shoes, complaints that water was taken from the air and difficulties experienced with electrical equipment. The paper acknowledged the last as a valid one, but outlined precautions through using better installation and insulation. A warning was sounded against thinking that with dust on the bottom allayed it is unnecessary to rock-dust. Roofs and ribs still must be rock-dusted.

In a discussion of the paper Prof. Cothorn called attention to the difficulties that varying conditions introduce into practical research. Based on conditions, a number of answers might be gotten.

Commenting on a discussion by H. D. Smith, general manager, Jewell Ridge Coal Corp., who told of difficulties in a certain mine where shuttle cars at the face churned up the dry fireclay to such an extent that the cars could not get traction to leave the face, Mr. Thomas suggested that salts would have caused enough moisture absorption to consolidate the loose fireclay.

Mr. Spindler, in his paper on "The Value of Mining Short Courses," gave full credit to the vocational type, which he said has gained favor during the emergency and which will hold its place, but warned that time restrictions of those courses must definitely limit their scope. Furthermore, he warned against the trend to assume that vocational training can fill the entire needs of any industry.

For career supervisors of the future he suggested the possibility of a college-level short course of one or two years and as an example described the two-year curricu-

lum in mine surveying at West Virginia University. He emphasized that no short cut has been devised for complete professional training.

The college-level short course may offer a better prospect for supplying those career supervisors than the strictly professional courses. W. E. E. Koepler, secretary, Pocahontas Operators' Association, said the fact that less than 20 percent of the men discharged from the armed forces are returning to the mines indicates the need for vocational training.

That some coal men discouraged the leasing of land for gas developments in southern West Virginia but that so far the new developments have not equaled the depletion was brought out in a paper by Mr. Krebs. It said, however, that after the war the area will have to seek new markets. Raleigh and Wyoming counties lead in the new developments but the cost of wells there is twice that of wells to the same depth in the Kanawha field. Of the 180 wells in those two counties 22 percent have been dry holes and the average rating of the producing wells is 600,000 cu.ft. The dollar value of natural gas produced in West Virginia is greater than that in any other State, although some other States exceed West Virginia in volume of production.

Answering a question by Mr. Price, Mr. Krebs said that the large gas-producing interests try to hold the area per well up to 300 to 500 acres. R. H. Allen, general manager, Well Service, Inc., Charleston, said that gas reserves in West Virginia amount to 2 trillion 500 million cu.ft., or about one-half of all gas reserves in the Appalachian area. There was some discussion of the necessity of leaving pillars of 200-ft. radius or greater around oil wells. The gas men favor reducing pillar

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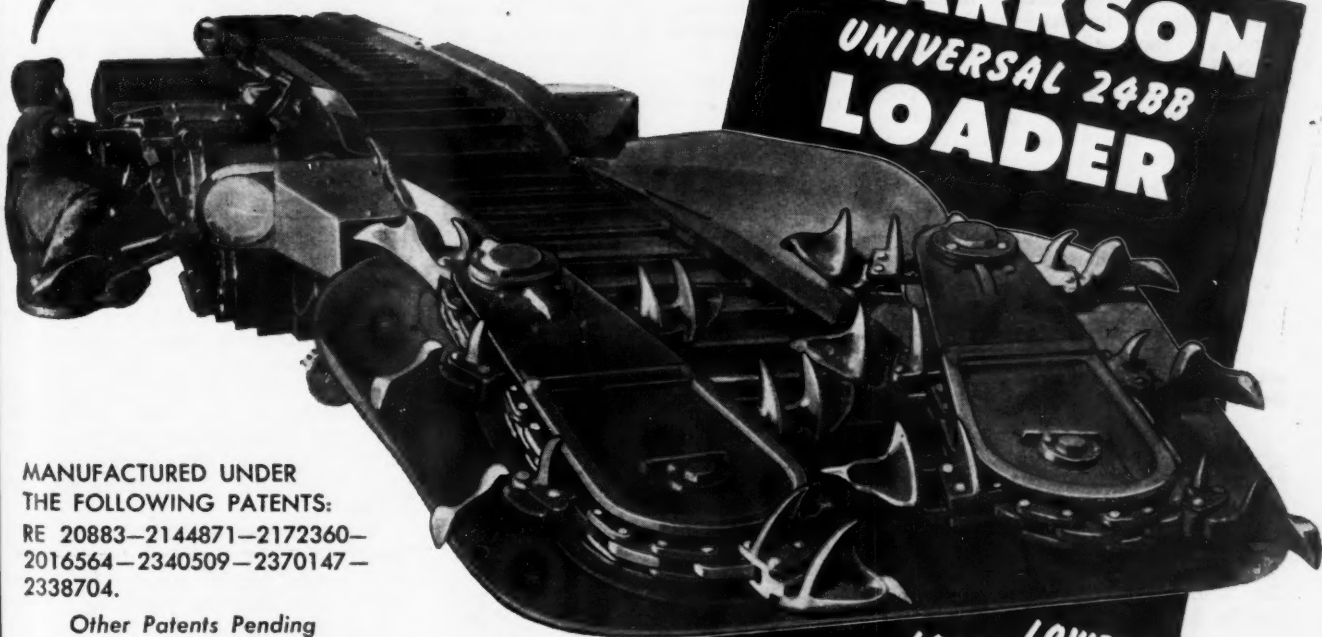
No other Loader offers the easy adjustability to very low coal as does a CLARKSON Universal 24BB LOADER. The operator practically lays down in a comfortable position with ALL controls within easy reach, and with a clear view ahead *all the time!*

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size but the coal men indicate safety will not allow a reduction.

Mr. Flippen, in explaining the Central Appalachian Section, A.I.M.E., plan for several \$300-per-year scholarships to the universities of Kentucky and West Virginia and to Virginia Polytechnic Institute covered the same ground as was included in the report (*Coal Age*, June, 1945, p. 140) of the local meeting of the Central Appalachian Section at Morgantown, W. Va., May 11. Secretaries of several of the twelve operators' associations in the area reported they are now prepared to put the money on the barrel head. Prof. Cothorn, who is chairman of the committee on awards, said that candidates for the examinations to be held at Charleston Sept. 8 should be registered with the committee by Aug. 25. It is hoped to get some scholarship students into college this fall.

WPB Will Revoke Priority Control

To facilitate the reconversion of industry and speed the flow of peacetime products into the hands of consumers, the War Production Board made some sweeping moves late in August. Action was taken Aug. 22 to eliminate at the end of September the wartime priorities control system, including the Controlled Materials Plan, and to substitute a new limited system for use during the reconversion period. The changes were made through amendments to Priorities Regulations 28 and 29, new Priorities Regulation 29 providing:

1. Cancellation, effective at once, of all "AA" preference ratings (which includes all ratings except the special "top priority" AAA, the new military MM rating previously announced and the new CC rating described below) on purchase orders that call for delivery after Sept. 30, 1945. There is one exception—the AA ratings will still apply to textiles.
2. The revocation of the Controlled Materials Plan, WPB's master plan for controlling wartime production, effective Sept. 30, 1945.
3. Cancellation, effective at once, of all allotments of steel, copper and aluminum (the three "controlled materials") for the fourth and subsequent quarters.
4. Introduction of a new junior, non-extendible, civilian "CC" preference rating to be used in limited cases to break bottlenecks in reconversion and insure, when necessary, continued production and services.

Battelle to Study Water-Gas Generator

Under the sponsorship of the American Gas Association, research engineers at Battelle Memorial Institute, Columbus, Ohio, have set out to determine what goes on in a water-gas generator. For more than 60 years, gas has been made from

steam and coal or coke by the water-gas process, and, for just as long, the exact method by which the gas is formed has been a matter for discussion and speculation.

As explained by Ralph Sherman, supervisor of fuels research at Battelle, a greatly increased demand for manufactured gas for residential heating is expected after the war. To meet this demand, the gas industry faces a great expansion in production. Processes and plants of large output and low capital cost are required, because the full capacity is needed but a few days per year. A more complete knowledge of the mechanism of the water-gas reaction may permit changes in design or operation that will obtain from the highly reliable water-gas set more gas at lower cost.

Availability of cheap oxygen in the post-war period may make it economical to mix oxygen with the steam to produce more gas without increase in the size of the generator. Gasification under high pressures should make it possible to reduce the size and cost of the gas-making equipment. The effect of such modifications on the mechanism of the combination of carbon and steam will be investigated as part of the research at Battelle.

This investigation is part of the million-dollar research program being conducted by the Manufactured Gas Production Research Committee of the American Gas Association to assure the availability of manufactured gas at low cost for all requirements after the war.

Sutphen Returns To Bergen Record

James R. Sutphen, who joined the *Coal Age* staff Aug. 12, 1943, as assistant editor, has resigned effective Aug. 10 to return to newspaper work. He goes back to the *Bergen Evening Record*, Hackensack, N. J., as assistant managing editor, after nearly two years in labor, government and public relations, marketing, utilization and other specialization on *Coal Age*.



James R. Sutphen

Plan Two Centers For Oil Research

Two major petroleum research centers, one at Linden, N. J., and the other at Baton Rouge, La., are to be constructed by the Standard Oil Co. (New Jersey), at an outlay of about \$8,000,000, it was disclosed Aug. 22 by Eugene Holman, president of the company. Eight buildings containing 350,000 sq. ft. of space are contemplated for Linden, while one building of 35,000 sq. ft. will be erected at Baton Rouge.

R. P. Russell, president of the Standard Oil Development Co., said the new laboratories would be used not only for developing improved products from oil and processes for producing them but also for much work in extending sources of supply of oil products, including production of liquid hydrocarbons from natural gas, gasification of coal and production of oil from other carbonaceous products such as oil shale.

Illinois Joint Board Adjudicates Disputes

Five cases in dispute between the United Mine Workers, District 12, and the Illinois Coal Operators' Association relative to interpretations of the national wage agreement were adjudicated by the joint group board July 25-27.

In a case wherein the mine workers demanded pay for the lunch period for outside men during the month of April it was decided that the outside men whose normal shift is now 8 hours and 15 minutes should be paid retroactively to April 1 for the 15-minute lunch period. When the individual put in more than seven hours elapsed time in any one shift this payment shall be at time and one-half; when he put in seven hours or less in any one shift the payment shall be at straight time. No retroactive payment is due outside men whose normal shift is 8 hours and 35 minutes.

It is recognized that at some mines the outside men started the 8-hour and 15-minute shift sooner than at other mines. The retroactive payment is due until the outside men started on the 8-hour and 15-minute shift, but not later than May 10, 1945.

The miners demanded in another case that in staggering men during the 15-minute lunch period on higher classification work, they should be paid for this 15 minutes at the higher classification rates, and it was decided that the demand of the miners be allowed, effective as of Aug. 1, but that no retroactive payments be made.

It was further decided that except in emergencies the staggered lunch periods shall extend for 30 minutes before and 30 minutes after the lunch period that existed as of March 31, 1945, making 1 hour and 15 minutes all told, any 15 minutes of which each employee shall be instructed to take his lunch. An employee

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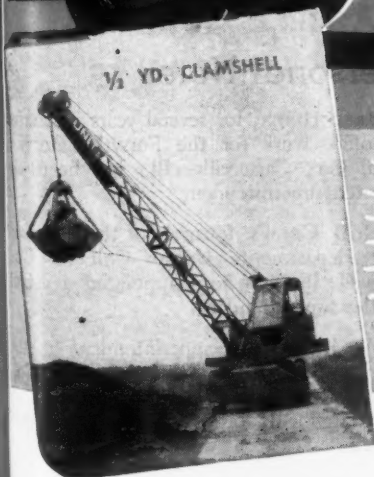
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Prolong the Life of Mine Motors REWIRE WITH **DELTABESTON**

Are heat, moisture, oil, grease or corrosive vapors constantly playing hob with the motors in your mine? If they are, you know the inconvenience of sending your motors to the repair shop frequently. While you can't eliminate the presence of these destructive agents, you can prolong the life of mine motors by rewiring with Deltabeston Asbestos-insulated Magnet Wires.

Deltabeston Asbestos-insulated Magnet Wires are designed to protect motors against high ambient temperatures and overload heat. Despite very severe operating conditions, Deltabeston's impregnated asbestos insulation just won't bake out. Deltabeston not only successfully withstands high heat and other deteriorating conditions but can be formed into the most intricate shapes without rupturing the insulation. It is available in round, square and rectangular shapes in a complete range of sizes. If you prefer ready-made coils with class B insulation, specify Deltabeston.

You can obtain additional information by writing to Section Y951-10, Appliance and Merchandise Dept., General Electric Co., Bridgeport, Conn. All Deltabeston Wires and Cables are distributed nationally by Graybar Electric Co., General Electric Supply Corp. and other G-E Merchandise Distributors.

BUY WAR BONDS AND KEEP THEM

GENERAL  ELECTRIC

shall perform any classification work as requested by the management during any part or all of the staggered lunch periods. The above is applicable to the staggered lunch period and in no way changes the wage agreement with respect to the direction of the working forces and the rights of management. During the staggered lunch periods, the rate of pay for the 15-minute period during which the mine worker eats his lunch shall be the rate at which he is regularly employed.

On the mine workers' demand that the ninth hour on the seventh consecutive day shall be paid inside men at the rate of \$2 instead of \$1.50 it was decided that the demand of the miners be denied. The flat rate of \$1.50 for the ninth hour shall be paid each day regardless of whether it be Monday, Tuesday, Wednesday, Thursday, Friday, Saturday or Sunday.

In a case where the miners demanded that outside men who work more than 8 hours and 15 minutes shall receive their proportionate part of \$1.07 the decision was that for the purpose of computing pay for outside men when they work less time than their regular shifts, the factors used in the appendix and the examples shown in the interpretations of May 8, 1945, shall apply.

Further, when outside men whose regular shift is 8 hours and 15 minutes work more time than their regular shifts, they shall be paid in addition to their normal pay at the rate of 13c. flat per hour for all such overtime, whether the overtime occurs on Monday, Tuesday, Wednesday, Thursday, Friday, Saturday or Sunday.

Further, when outside men whose regular shift is 8 hours and 35 minutes work more time than their regular shifts, they shall be paid in addition to their normal pay at the rate of 12½c. flat per hour for all such overtime, whether the overtime occurs on Monday, Tuesday, Wednesday, Thursday, Friday, Saturday or Sunday. At no time shall time and one-half or double time be applied to the 12½c. and 13c. rates. These payments are retroactive to April 1, 1945.

Where the miners demanded that each start and every legal holiday must be computed as a work day in order to arrive at the sixth and seventh consecutive day, no dispute exists and it is agreed that past procedure shall be continued with the understanding that a "legal holiday" shall be construed as those listed in Executive Order 9240.

Personal Notes

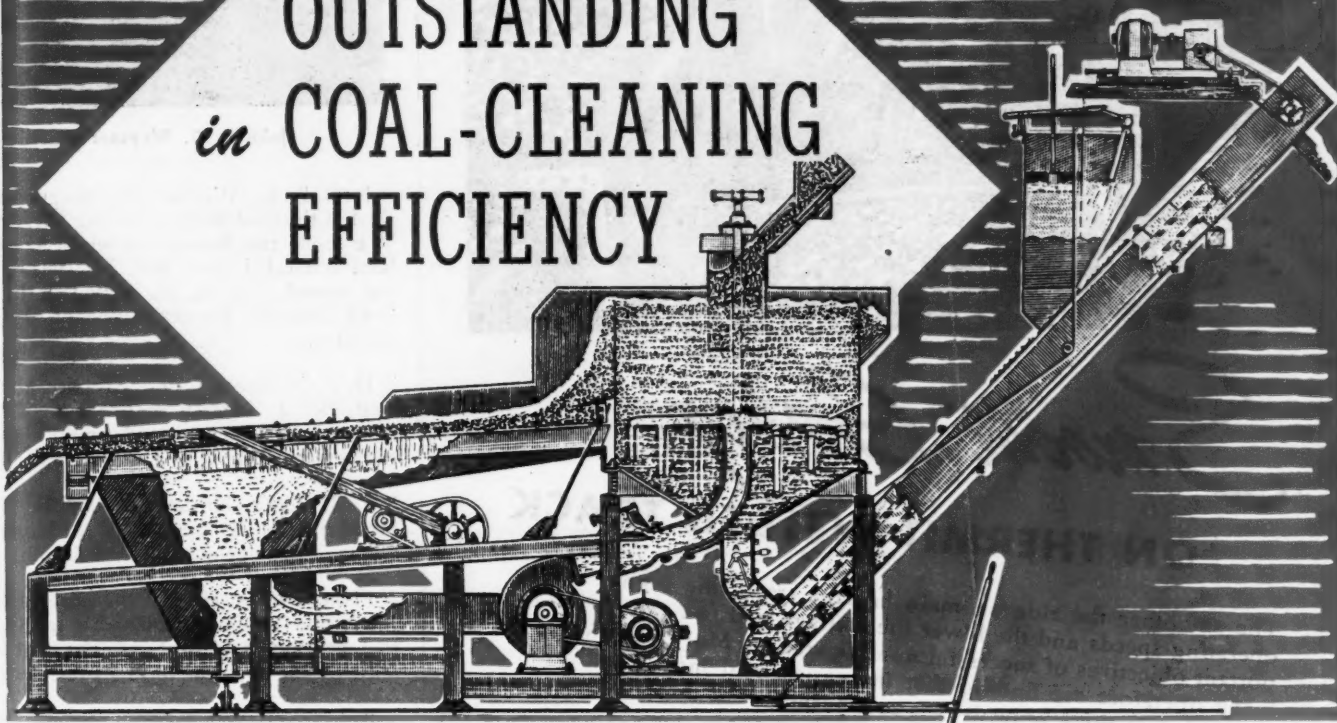
FRED HEIEN, for several years in charge of office work for the Forsyth-Caterville Coal Co., Caterville, Ill., has been appointed superintendent.

G. B. CREWS, formerly of the engineering department, Union Colliery Co., Dowell, Ill., has been appointed assistant to the superintendent.

W. K. LAMBIE, superintendent at the Somers mine of the Pittsburgh Coal Co., has been assigned additional duties as superintendent at the company's Mongah mine.

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WILMOT HYDROTATORS have been proved by every known test to be the most highly efficient hydraulic coal-cleaning unit. Exclusive mechanical features offer definite advantages in these five ways:

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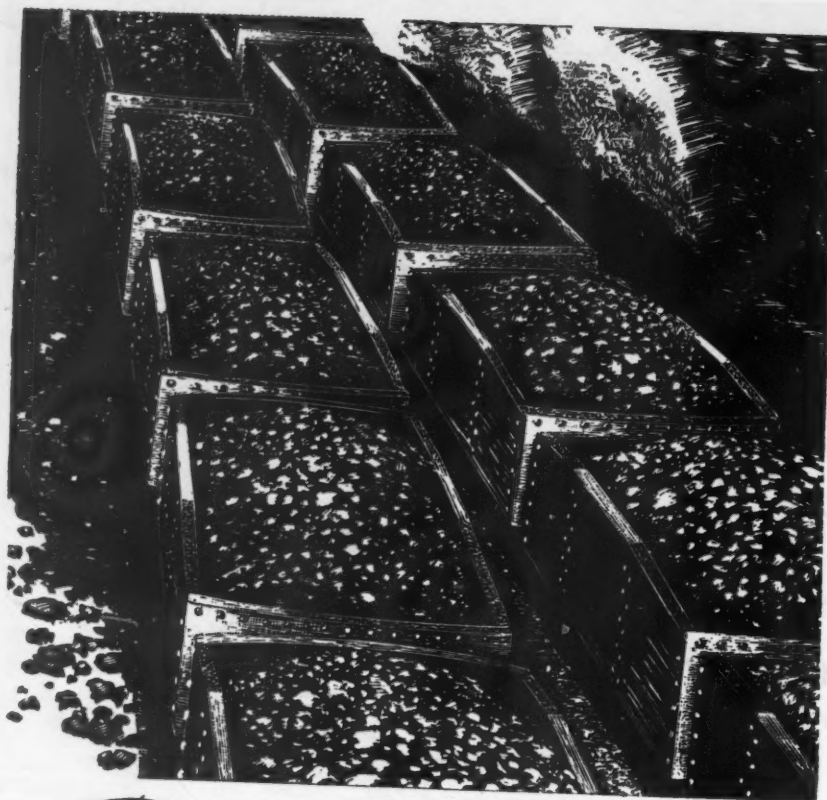


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The smoother the ride on main haulage track, the higher the operating speeds and the lower the spillage will be... both important objectives of successful mine operation. More and more, many operators are finding that the easiest and most practical step to attain these objectives is to Thermit weld the rail joints to form continuous track.

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John L. G. Weysser

JOHN L. G. WEYSSER has resigned as chief of the Coal Section, Mining Division, War Production Board, with which he had been connected since Nov. 15, 1941. He was named chief of the section in July, 1943, following the resignation of D. L. McElroy.

H. F. McDONALD, formerly vice president, Bell & Zoller Coal & Mining Co., Chicago, has been named president of the company, vice D. H. McMaster.

E. L. CARR, hitherto assistant to the president, Bell & Zoller Coal & Mining Co., has been appointed vice president.

MARCUS KERR, chief of the Division of Mines and Mining of Ohio, has resigned that position as of Sept. 1. The post is filled by the governor for a six-year term.

BYRON C. CASSEL has been promoted by the Reading Co. from coal freight agent to general coal freight agent. Joining the company in 1924, he became tariff clerk in the office of the general coal freight agent in 1930.

ROGER S. WAYNE has been advanced by the Reading Co. from chief clerk to the vice president in charge of freight traffic to coal freight agent. Joining the company in 1918 as office boy, he has advanced steadily, becoming assistant chief clerk in the general freight office in 1933, secretary to assistant vice president in 1936, chief clerk to assistant vice president in 1938 and chief of tariff bureau in 1939.

E. C. SKINNER has been appointed superintendent of Montour No. 4 and Henderson mines of the Pittsburgh Coal Co., vice T. G. Ferguson, promoted. A graduate mining engineer from Lafayette College, he has been with the company since 1936, recently as staff assistant to the production manager.

COLONEL ROBERT P. KOENIG, who was Chief of the Fuels Section of General Eisenhower's staff and who in civilian life is president of the Ayrshire Collieries Corp., Indianapolis, Ind., has been ap-

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protects your equipment from corrosive mine water

Intake and discharge lines in this bituminous mine pumping station and the pipe line going up into a bore hole, are all protected from the action of acid mine water by MANHATTAN FLEXLASTICS Lining.

The perfectly bonded lining is taking a pressure of 185 p.s.i. from a head of 370 feet, and is not affected by water with 283 parts per million of free acid, nor by the abrasive action of 2,200 parts per million of solids (fire clay, coal, etc.)

The small inset picture (upper left) shows MANHATTAN RUBBER-LINED PIPE, still in service after 11 years in a large anthracite mine—one of the earliest installations in the country.

Regardless of the character and content of your mine water, you can get this kind of protection for your pumping lines by using MANHATTAN FLEXLASTIC-LINED PIPE.

Mildew-Proofed Underground Conveyor Belt is another MANHATTAN coal mine development. There is over 12,000 ft. of MANHATTAN Conveyor Belt in use by this bituminous coal company.



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APPROVED VENTILATION

provides safer working conditions

By **W. E. BROWN, E. I. du Pont de Nemours & Co. (Inc.), Member,**
American Institute of Mining and Metallurgical Engineers



"Ventube" delivering good air at the working face

MINING AUTHORITIES have found that improved ventilation at the face results in marked increases in working efficiency. With the use of auxiliary blowers and Du Pont "Ventube" rubberized duct, dust raised by mechanical loaders and conveyors is quickly removed. Working conditions become more comfortable and healthful. Production is accelerated.

With these advantages to be gained, operators insist that local mine laws and regulations be observed in installing and handling blower and tubing. For example, the blower must have a permissible motor and adequate air capacity. It should be set 15 feet upstream from the last crosscut or room-neck in a secure position. "Ventube" should be suspended from the roof, or from pegs on the wall, by messenger wire. Thus suspended, the tubing will not be damaged by men, gob and moving equipment. If sharp bends are necessary, elbows should be used. The blower-tubing system should be oper-

ated continuously to keep the face clear at all times. Before starting the blower, the area should be checked for presence of gases. If present, these must be removed by approved methods before the blower is turned on. If the power should fail, the switch should be turned off so that the blower will not go on automatically.

* * *

"VENTUBE" is Du Pont's registered trade mark for its flexible, rubberized ventilating duct. For more details on how "Ventube" can help promote better working conditions, boost production and help cut costs in your mine, just write: E. I. du Pont de Nemours & Co. (Inc.), Fabrics Division, Fairfield, Conn.



BETTER THINGS FOR BETTER LIVING
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pointed Chief of the Solid Fuels Section of the U. S. Forces, European Theater of Operations; co-chairman of the Combined Coal Committee of the Allied Control Commission for Germany and representative of the Commanding General USFET on the European Coal Organization. His appointment came with the disbandment of Supreme Headquarters Allied Expeditionary Forces on July 13.

T. C. FERGUSON, superintendent of Montour No. 4 and Henderson mines of the Pittsburgh Coal Co., has been promoted to division superintendent in charge of eight mines and two preparation plants. A graduate mining engineer of Carnegie Institute of Technology, he spent two years after his graduation with the Koppers Coal Co. before joining the Pittsburgh Coal Co., with which he has been associated in various capacities almost continuously since 1933.

GEORGE B. DICK, president of the Dick, Gordon and Butte Valley Coal companies, with offices in Walsenburg, Colo., has been appointed to the Colorado State Planning Commission's committee on minerals, oil and mining development.

CHARLES E. LAWALL, president of West Virginia University, has been appointed engineer of coal properties for the Chesapeake & Ohio Ry. He succeeds Ira F. Davis. Graduated from Lehigh University in 1914, he held positions as testing engineer, chemist, mining and research engineer for various companies before returning to Lehigh in 1921 as an instructor. He later became professor and director of the West Virginia University School of Mines, becoming president in 1939.

IRA F. DAVIS, engineer of coal properties, Chesapeake & Ohio Ry., has been made assistant vice president. He entered C. & O. employ in 1920 as general manager of the road's mine operations at Dorothy, W. Va., later was chief of the allotment committee and then was promoted to engineer of coal properties.

H. L. BEATTIE, formerly superintendent of Glen White, Helen and Stotesbury mines of Koppers Coal Division, has become general manager of operations of the Davis Coal & Coke Co. with mines in Maryland and West Virginia.

Suspension of Rates To Continue

Railroads have agreed to further extension to Jan. 1, 1946, of the suspension of 1942 freight-rate increases. Giving as the reason for this action that they did not want to start prolonged hearings in view of current travel and manpower problems, they stated specifically that this should not prejudice any future action they may wish to take. The rate increases, averaging 4.7 percent, were effective from March 18, 1942, to May 15, 1943, when they were suspended largely because of insistence by government agencies that higher rates would add to wartime inflation problems.

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FIRESTONE Off-the-Highway Tires cut operating costs because they keep right on rolling after other tires have taken the final count. Contractors have proven this on every kind of job everywhere.

They stand up under terrific punishment because of the materials and workmanship that Firestone puts into their construction. Bodies are made of the strongest rayon cord, Gum-Dipped for extra life. There are four extra plies to take impact blows. Sidewalls are double thick — an extra safeguard against rutwear and snags. The tread is strong, tough, cut-resistant.

These are the reasons why Firestone tires will cut your operating costs and increase your profits. They are built to do the job — and to stay on the job.

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TIRES



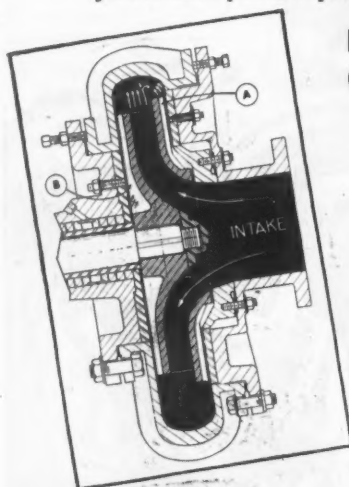
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SAVE POWER . . . CUT REPLACEMENT COSTS . . .

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EXCLUSIVE MORRIS Impeller Design Gives Longer Wear and Less Leakage

1. External ribs of larger diameter on the suction side of the impeller — an exclusive Morris feature — set up a higher localized pressure than exists in the pump shell (see A in the diagram), reducing circulation of abrasive solids between the impeller and the suction disc, and cutting down eddy losses and leakage.

2. Other vanes on the opposite side of the impeller (see B in the diagram), create a flow away from the stuffing box, reducing the pressure at that point and substantially increasing the life of the packing.

Our engineers will gladly consult with you on your slurry pumping problems. No charge, no obligation.

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CENTRIFUGAL PUMPS

EQUIPMENT APPROVALS

Three approvals of permissible equipment were issued by the U. S. Bureau of Mines in July, as follows:

Jeffrey Mfg. Co.—Type 43-L Short-walloader; 50-hp. motor; 500 volts, d.c.; Approval 533A; July 20.

Goodman Mfg. Co.—Type 97-6-26 belt conveyor; 20-hp. motor; 440 volts, a.c.; Approval 534A; July 26.

Joy Mfg. Co.—Type U-166-37N belt conveyor; 40-hp. motor; 500 volts, 50 cycles, a.c.; Approval 535A; July 30.

Road Contract Let For Synthetic Fuel Plant

A contract for the installation of roads between buildings and the construction of underground sewer, water, gas and electrical lines at the new synthetic fuels research and development laboratory of the U. S. Bureau of Mines at Bruceton, Pa., has been awarded to B. L. Winner Co., Inc., Pittsburgh, Pa., on a bid of \$107,500, according to an announcement by Secretary of the Interior Harold L. Ickes.

Pittsburgh Coal Co. To Fight OPA Suit

Facing damage suits filed in federal court at Pittsburgh July 23 alleging price violations, western Pennsylvania coal operators are countering with charges that the Office of Price Administration is using them as legal guinea pigs in an effort to have the federal courts clarify the agency's own snarled rulings. A suit for \$1,050,000 against the Pittsburgh Coal Co. and the Champion Coal Co. by OPA describes Champion as a wholly owned subsidiary of Pittsburgh Coal and says the subsidiary was set up a year ago last January as a "fictitious corporate entity" so that higher prices could be obtained than would otherwise be possible under regulations.

OPA charged that there were irregularities in wholesale and retail transactions; that there were erroneous records, which OPA men were not allowed to inspect, and that overcharges were made for delivery and other services.

J. B. Morrow, president, Pittsburgh Coal, says he intends to fight the suit to the limit. According to Mr. Morrow, the company repeatedly asked the OPA office to define its regulations but received no answer. If there were pricing errors, he said, they were caused by "rulings so confusing that they were not even clear to those whose duty it was to enforce them."

The company cites a regulation in effect during 1944, when the violations are alleged to have occurred. This says, in part: "The maximum price shall be the maximum price of the most closely competitive dealer of the same class. . . ." When it attempted to apply this ruling, the com-

What is the difference between and in MINE HOIST GEARS?

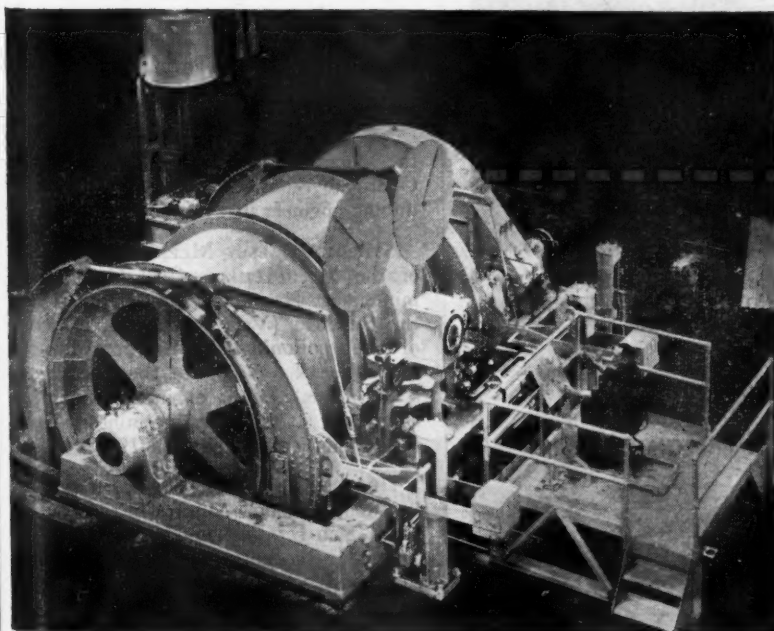


THE DIFFERENCE between these two gear patterns is that one has a *Backbone* which gives it extra strength and capacity to withstand the shocks, stresses and wear encountered in mine hoist service. This *Backbone* (shown in red in the photograph) is formed by the juncture of the two helices to make the teeth continuous across the face, instead of being separated by a center groove.

Gears of this continuous tooth herringbone design, known throughout industry as the *Gear with a Backbone*, are precision generated by the famous Farrel-Sykes process. They operate with equal efficiency in either direction of rotation, providing safe, smooth power transmission to the hoist as it raises or lowers its load.

Overlap or interlacing of the teeth, gradual engagement and inclined line of pressure distribute the power load uniformly over the entire face width, reducing wear and maintaining correct tooth action throughout a long gear life.

For further information on Farrel gears and gear units, write for a copy of catalog No. 438.



Farrel-Birmingham supplied the continuous tooth herringbone reduction gears for this double-drum mine hoist, designed and built by the Wellman Engineering Company. The hoist exerts a max. rope pull of 22,000 lbs.

FARREL-BIRMINGHAM COMPANY, INC.

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FB-242

Farrel-Birmingham

Protect Preformed Rope with "FIST-GRIP" clips



Look at this cross-section view of what happens to wire rope — when "Fist-Grip" Safety Clips are used . . . and when "Finger-Pinch" U-bolts are used. Notice how "Fist-Grip" Safety Clip holds rope with scarcely any change in its original shape . . . and how "Finger-

Pinch" bolt crushes the rope as evidenced by the distorted hemp center under the "U".

Both clips tightened to exactly same tension with torque-indicating wrench.

Why "FIST-GRIP" clips are better for rope

Improved bearing surfaces of "Fist-Grip" Safety Clips deliver even, firm pressure on all parts of rope, thus keeping it straight and strong — preserving the extra quality you paid for when you specified "preformed".

"Fist-Grip" clips deliver full rope strength with less clips. 3 do the work of 4 U-bolts.

They're easier to install too. Nuts are on opposite sides. Made in identical halves, they can't be put on backwards. The only clips with drop-forged bolts.

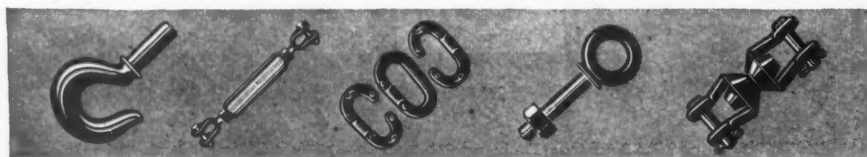
Order a few "Fist-Grip" Safety Clips today. Test them. Discover their time-saving, money-saving, material-saving advantages.



Distributed through mill, mine and oil field supply houses. Send for Laughlin's catalog of wire rope and chain hardware. Address Dept. 1, The Thomas Laughlin Co., Portland 6, Me.

LAUGHLIN

THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS



pany says, it was told by OPA that it could not because the prices of the competitor were under attack.

OPA has made the Consolidation Coal Co. the defendant in a \$375,000 action. Greensburg-Connellsville Coal & Coke Co. and the Baton Coal Co. have been sued for not less than \$300,000. And OPA has announced that three more suits will be filed soon.

Charles Baton, vice president of Greensville-Connellsville and president of Baton Coal Co., charged that OPA wanted the courts "to find out what prices we should charge."

Anthracite Used in Making Atomic Bomb

Anthrafil, a specially prepared small size of anthracite, played a part in the manufacture of the atomic bomb, which is believed to have shortened the war, according to Cadwallader Evans Jr., vice president and general manager, Hudson Coal Co., Scranton, Pa.

"The first order for Anthrafil for these new and very secret plants in the far-off State of Washington," said Mr. Evans, "was received by the Hudson Coal Co. Oct. 26, 1943. Shipments began on a small scale Dec. 11, 1943, and were continued from time to time until Nov. 10, 1944. A total of 2,466 tons of Anthrafil was sent to the State of Washington, the last carload starting on Oct. 5, 1944. The carload shipments did not quite furnish enough for all the filters, and as a consequence an emergency express shipment of 27½ tons was started off from Marvne breaker, in Scranton, Nov. 10, 1944. The express charge on this special shipment was \$6,444.42, which makes clear that the material was urgently needed."

Obituary

A. CLARK STAHL, 78, assistant mining engineer for Lehigh Valley Coal Co. operations throughout the anthracite region, died Aug. 2 in the General Hospital, Wilkes-Barre, Pa., following an operation. He began his career with the company 58 years ago as a member of a surveyor's corps, later serving as division engineer of the Centralia, Locust Mountain and Girard divisions, and becoming assistant mining engineer in 1910.

STEPHEN HALSEY MEEM, 66, president of the Meem-Haskins Coal Corp., with mines near Hazard, Ky., died Aug. 18 in the Bluefield (Va.) Sanitarium, a victim of blood poisoning. He had been ill more than a week. Going to the Pocahontas coal field as a young engineer just out of college, he started operating mines in Kentucky and West Virginia in 1915.

HUBERT E. MILLS, 60, secretary and treasurer, Alabama Mining Institute, died Aug. 18 in Birmingham. He had been associated with the institute as well as the Alabama Coal Association for many years, specializing in safety work at coal mines of the State.

Take the full load sooner!



BREAKING IN

**the new line is a short job with
PREFORMED YELLOW STRAND**

Let's agree that "slow and easy" is a good rule for putting most equipment to work — *Preformed Yellow Strand* included. Proper adjustment between wire rope and other operating parts extends rope life.

But a prolonged slow-down for starting a new rope is expensive. And it's *unnecessary* with *Preformed Yellow Strand*, because the factory process that preshapes wires and strands is equivalent to a *preliminary break-in*.

When flexible *Preformed Yellow Strand* reaches you it is notably relieved of internal stresses. You save much of the time that would be spent

trying to relax the stiffness of a corresponding unpreformed rope. After a short, gradual stepping up—to bed the strands firmly on the core—you can take the full load.

The same rope tractability aids production in other ways. *Preformed Yellow Strand* is installed quickly. It resists kinking...stays in the sheave grooves...curbs

overwinding on the drum.

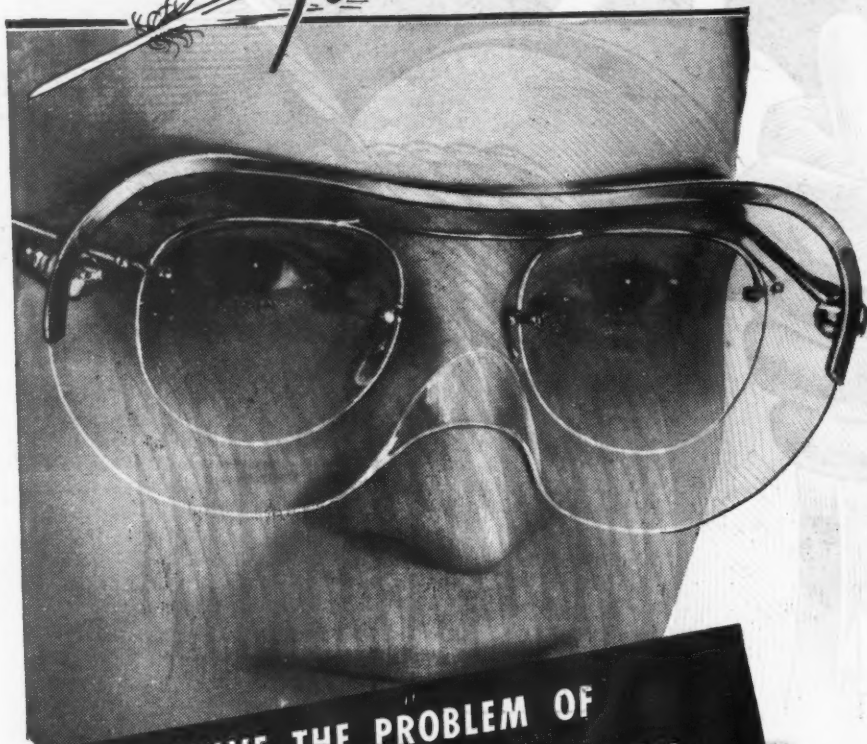
Specify *Preformed Yellow Strand* by name. Get all you should in wire rope performance and economy. Broderick & Bascom Rope Co., St. Louis 15, Mo. *Branches:* New York, Chicago, Houston, Portland, Seattle. *Factories:* St. Louis, Seattle, Peoria.

HAND BOOK FREE: "Wire Rope for Mining" contains useful facts, tables, pictures. Write for your copy.



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Up Nova Scotia Prices To Boost Miners' Pay

The price of coal from Nova Scotia collieries was increased 33c. a ton effective Aug. 15 to provide wage increases and an additional week's vacation with pay for about 12,000 miners, it has been announced by Freeman Jenkins, president of District 26, United Mine Workers of America. The pay rise, which probably will amount to \$1,800,000 annually for Glace Bay district employees, will be subject to whatever terms are agreed upon by the union and the mine operators through collective bargaining. It will be effective for two years and retroactive to Feb. 1 last.

Nationalization of Canadian coal mines "if necessary" was suggested by Frank W. Smith, appearing on behalf of the Owen Sound Board of Trade before the Royal Commission on Coal, sitting at Toronto under Justice W. F. Carroll, Halifax. Establishment of an Ontario fuel commission, to administer all solid fuels brought into Ontario, was recommended by W. A. Caut, Burlington.

Mervyn Brown, chairman of the board of Allied Industrials, Ltd., asked the commission to recommend Federal Government assistance in developing coal-mining property at Sheep River, Alberta, which has been investigated by Allied Industrials.

Tariffs should not be used to place United States coal in an impossible competitive position with Canadian coal, said George B. Langford, director of the Ontario Planning and Development Branch.

Elimination of the 50c.-per-ton duty on anthracite going into Canada from the United States, "so that British and American anthracite may be on the same competitive basis," was advocated Aug. 21 by Pennsylvania anthracite distributors at the second day's hearing of the Carroll commission in Montreal.

Preparation Facilities

PAU MAU COAL CO., Muhlenburg Co., Kentucky—Contract closed with McNally-Pittsburg Mfg. Corp. for complete preparation and cleaning plant to wash and prepare 400 t.p.h. of mine-run coal and incorporating the following features: preliminary raw-coal screens to prepare mine-run for hand-picking lump size or optional crushing to minus 6 in. for washing; 6x1½ in. to be washed in one McNally-Norton coarse-coal washer; 0x1½ in. to be washed in one McNally-Norton fine-coal washer; middlings products from both coarse- and fine-coal washers to be crushed and re-treated in McNally-Norton re-wash box; washed-coal classifying screen to prepare five grades of coal for loading; vibrating screens for dewatering and classifying fines for proper centrifugal dewatering in two McNally-Carpenter centrifugal dryers; complete facilities for optional mixing and blending; complete stoker-coal crushing and rescreen facilities; all loading tracks equipped with McNally-Pittsburg pneumatic-controlled car retarders and automatic boom loading chutes; to be completed about November, 1945.

WHERE TOUGHEST SERVICE HITS TIRES HARDEST

General's EXTRA QUALITY stands out!

The General Rock Special is designed to give maximum efficiency . . . and lowest tire costs . . . on rocky ground hauling.

The broad, flat tread design puts more tread to work for peak load capacity and stability . . . gives positive traction on roughest ground and all-directional skid protection . . . yet rolls freely without snagging. Deep sidewall tread of extra-tough rubber

armors against cuts, tears and abrasion.

A special ply-bonded "cushion" construction *absorbs* shock stress evenly throughout the tire . . . minimizes the effects of abuse.

The same Top-Quality that has made Generals America's long-mileage favorites for 30 years . . . gives the General Rock Special the kind of *extra-stamina* that delivers longest, low cost service on toughest jobs.

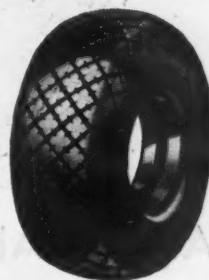
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GENERAL ROCK SPECIAL



GENERAL DEEP CLEAT



GENERAL EARTH MOVER

BLUE PRINT FOR BETTER DUST SEPARATION



AIR-CLEANING FINES

WITH THE **STURTEVANT** "WHIRLWIND" CENTRIFUGAL

FOR
GREATER
TONNAGE

MORE
THOROUGH
DUST
REMOVAL

LOWER
OPERATING
COST

For the rapid and economical cleaning of fine coal the answer is . . . air separation of dust from fines, by the Sturtevant Whirlwind Centrifugal. The Sturtevant removes dust from any given fine mesh size of coal and delivers tailings with no air escape, no dust problem. The whole operation is entirely contained.

Sturtevant efficiency lies in the exact counterbalance and control of centrifugal force and air-currents to handle particles with highest efficiency—at lowest cost for POWER and MAINTENANCE. The Sturtevant is the result of 20 years' experience designing and constructing centrifugal air separators. The cement industry, where air separation is most difficult and exacting, uses hundreds, continually re-orders, has never rejected a single one.

SEND FOR BULLETIN 087



BLACKFOOT COAL & LAND CORP., Oakland City, Ind.—Contract closed with McNally-Pittsburg Mfg. Corp. for complete coal preparation and cleaning plant incorporating the following facilities: receiving mine-run coal, delivering to combination rail and truck hopper and withdrawing mine-run from hopper at uniform rate of 500 t.p.h.; all mine-run to be broken to approximately 0x8 in. by McNally-Pittsburg double-roll heavy-duty breaker; raw-coal sizing screen to classify 4x1½ and 0x1½ in. for washing in McNally-Norton automatic washers with provision for hand picking and crushing the 8x4 to minus 4-in. and delivering to coarse-coal washer; middlings from secondary elevator in coarse-coal washer to be crushed and reworked in McNally-Norton fine-coal washer; washed-coal classifying screen equipped to classify into five grades; prepared sizes to be boom loaded to their respective tracks with provisions for mixing combinations of these sizes on the classifying screen for loading as mixed product or for mixing with raw coal; complete stoker-coal crushing and rescreening facilities with centrifugal drying provided for fine coals; to be completed about April, 1946.

TRUAX-TRAER COAL CO., Shamrock Mine, Kayford W. Va.—Contract closed with McNally-Pittsburg Mfg. Corp. for complete preparation and cleaning plant consisting of the following: 600-ton-capacity mine-run storage bin equipped with variable feeders to obtain uniform feed of 400 t.p.h. input; crushing facilities to reduce the plus 3-in. to minus 3-in. prior to washing; prescreening facilities for bypassing the 0x½-in. raw coal direct to loading with 3x½ washed in McNally-Norton automatic washer; washed coal to be classified into four grades with McNally-Carpenter centrifugal dryers for 0x½ in. when it is elected to wash fractions of this size; plus 1½-in. washed coals to be reduced to screenings via McNally-Pittsburg double-roll stoker-coal crusher; complete mixing facilities and boom loading of prepared sizes; refuse disposal by belt conveyor; to be completed about Nov. 1, 1945.

JOLIETT COAL CO., Tremont, Pa.—Contract closed with Wilmot Engineering Co. for one Type D Wilmot Simplex jig, feed capacity, 20 t.p.h. of stove coal; also one Wilmot Type D Simplex jig, feed capacity, 20 t.p.h. of nut coal.

NEW BLOCK COAL CO., Centerville, Iowa—Contract closed with Deister Machine Co. for one double-deck 3x6-ft. Deister Plat-O vibrating screen to produce 1½, ½x1½ and 0x½-in. coal; required capacity, 30 t.p.h.

RUSSELL FORKS COAL CO., Pikeville, Ky.—Contract closed with Robins Conveyors, Inc., for complete tippie (conveyors, screens, etc.) to treat mine-run and stoker coal; rated capacity, 450 t.p.h.; now in operation.

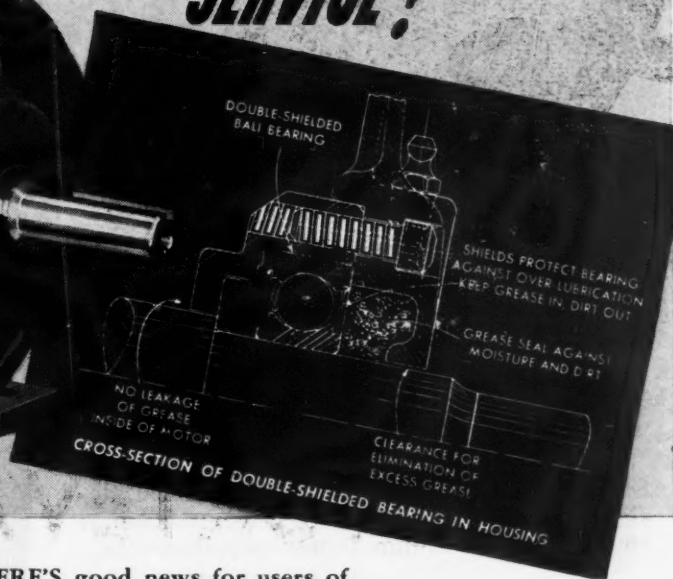
KOPPERS COAL DIVISION, Federal No. 3 Mine, Everettville, W. Va.—Contract closed with Kanawha Mfg. Co. for Kanawha-Belknap calcium chloride washer; capacity, 120 t.p.h.

KANAWHA MFG. CO. (for Winding Gulf Collieries), Charleston, W. Va.—Contract closed with Jeffrey Mfg. Co. for two-compartment unit washer to clean

RELIANCE *Series C* MOTORS

WITH DOUBLE-SHIELDED BALL BEARINGS

GIVE LONGER, TROUBLE-FREE SERVICE!



A BALANCED DESIGN, PRECISION BUILT

1. Protecting enclosures keep out dirt, chips, oil, excess moisture.
2. Steel stators for strength, incorporating experience from building motors to meet Navy high shock requirements.
3. Thirteen-step winding treatment, for maximum stator protection.
4. Pressure cast rotors provide trouble-free aluminum windings.
5. Heavy shafts, liberally designed for added strength.
6. Improved bearing lubrication affords real protection to bearings and windings.
7. Optional lead outlet arrangement permits machine mounting with elimination of conduit box.
8. Flange and face type brackets offer alternative methods of machine application.

Send for Instruction Sheet 3042, which tells about Reliance double-shielded bearing design and why it needs no special attention. Information worth having, and it's yours for the asking.

HERE'S good news for users of electric motors! No special lubrication attention is necessary with Reliance Series C Motors.

Just follow whatever greasing practice you have established for ball bearing motors. Properly lubricated, over-greased or under-greased, the Reliance design provides the answer to securing longer bearing life.

If under-lubricated after installation, bearings with this design will last longer than non-shielded bearings given the same treatment. This is because of grease retained within the shields plus grease remaining in the housing from its initial filling.

If over-greased after installation, they will operate satisfactorily without overheating, whereas non-shielded bearings under the same treatment may fail.

It is not necessary to disassemble motors at the end of fixed periods to grease bearings. Bearing shields do not require renewal.

Simplified lubrication procedure and longer life are good reasons for preferring Reliance A-c. and D-c. Motors. Some of the other reasons are indicated at the left. Write to or call the nearest Reliance office for complete information.

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HOLMES EQUIPMENT

• Designed for . . .

MODERN MINING

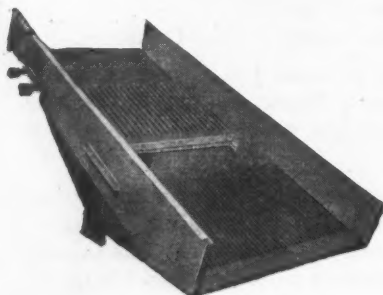


10-Ton Skip Bucket

464 cubic feet, overturning type skip bucket. Built to close tolerances for smooth and rapid operation.

Winding Drums

Straight face, conical or cylindro conical, designed from time study to give maximum speed, with minimum power requirements.



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Grizzlies are built in various sizes, to meet your requirements. Large capacity, non-clogging.

Holmes Lowering Spirals

Gently deposit fragile materials on the peak of the pile in bulk storage bins, eliminating vertical drop.



ROBERT HOLMES AND BROS.

BINS - GATES - LOWERING SPIRALS - DUST-O-LATORS - SHAKING GATES

DANVILLE, ILLINOIS

3x½-in. coal; capacity of raw coal feed, 160 t.p.h.

E. C. HORNE (for Keystone Coal Co., Denver, Colo.)—Contract closed with Jeffrey Mfg. Co. for single-compartment unit washer to clean 3x½-in. coal; capacity of raw coal feed, 75 t.p.h.

KANAWHA MFG. CO. (for C. H. Mead Coal Co., East Gulf, W. Va.)—Contract closed with Jeffrey Mfg. Co. for 7-ft. two-compartment five-cell Baum jig to treat 5x½-in. coal; capacity of raw coal feed, 250 t.p.h.

CRESCENT COAL CO., Central City, Ky.—Contract closed with Jeffrey Mfg. Co. for 7-ft. two-compartment four-cell Baum jig to treat 0x6-in. coal; capacity of raw coal feed, 400 t.p.h.

LECKIE COLLIERIES CO., Aflex, Ky.—Contract closed with Jeffrey Mfg. Co. for two-compartment unit washer to treat 0x5-in. coal; capacity of raw coal feed, 150 t.p.h.

NEW ALMA COAL CO., McCarr, Ky.—Contract closed with Jeffrey Mfg. Co. for tippie equipment to handle mine-run; capacity of raw coal feed, 250 t.p.h.

PHILADELPHIA & READING COAL & IRON CO., Locust Summit Colliery, Locust Summit, Pa.—Contract closed with Wilmot Engineering Co. for two 7-ft.-diameter Wilmot Hydrotators to prepare No. 4 buckwheat coal; total feed capacity, 170 t.p.h.; also two 9-ft.-diameter Wilmot Hydrotators to prepare No. 5 coal; total feed capacity, 100 t.p.h.

ST. CLAIR COAL CO., St. Clair, Pa.—Contract closed with Wilmot Engineering Co. for 16-ft.-diameter Hydrotator to prepare No. 5 coal; feed capacity, 65 t.p.h.

Higher Coal Exports Possible, Says Ickes

Coal will be needed in heavy volume for some time to come, according to new estimates of requirements made since the Japanese surrender. In fact, according to Solid Fuels Administrator Ickes, the requirements for the present coal year remain substantially the same. Consequently peak production will be necessary and certain distribution controls must be continued for the present, it is stated.

On the basis of present estimates of coal production and transport conditions, said Mr. Ickes, 8,000,000 tons of bituminous coal will be sent to Europe by the end of this year instead of the 6,000,000 tons previously scheduled as the quantity for which shipping would be available. "We do not intend to send to Europe any of the coals normally used here for home heating," he added.

Estimates submitted by the Solid Fuels Requirements Committee, the administrator said, showed that during the fuel year ending March 31 this country would need from 570,000,000 to 585,000,000 tons of bituminous coal, "depending on how much we can make available for export to Europe. It is hoped that our original production estimate of 575,000,000 tons for this period can be reached," although we must have continuous peak operation on

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✓ **even greater resistance to oxidation**

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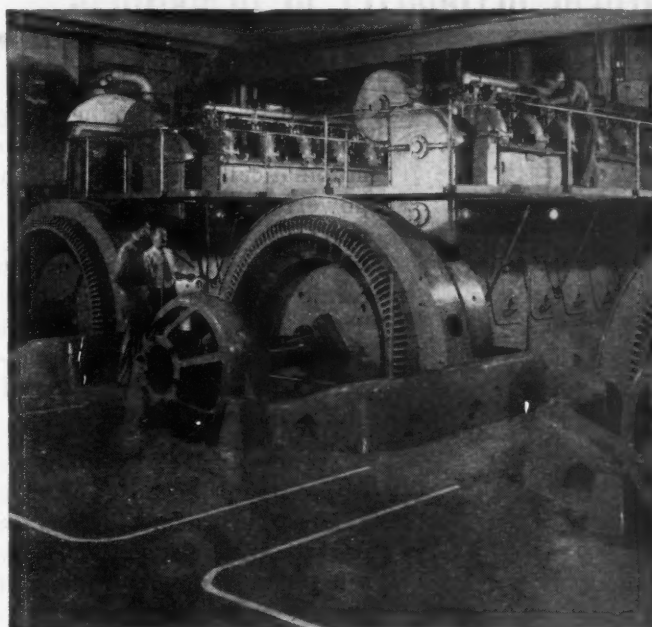
✓ **nonfoaming**

This improved oil can help you make further cuts in Diesel maintenance costs—

FOR OVER 15 YEARS Gulf Parvis Oil has been a leader in the lubrication of industrial and marine Diesels. Now modern petroleum technology makes possible a further improvement in this quality oil—giving it greater resistance to oxidation and longer life. And the new Gulf Parvis Oil is nonfoaming under any service condition!

In your Diesels, this improved oil means better protection against wear, longer Diesel life, and lower maintenance costs. More than ever, Gulf Parvis Oil is the ideal lubricant for industrial and marine Diesel engines!

For further information regarding this new improved Diesel lubricating oil, mail the coupon or get in touch with your nearest Gulf office.



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Please send me, without obligation, complete information on the new improved Gulf Parvis Oil.

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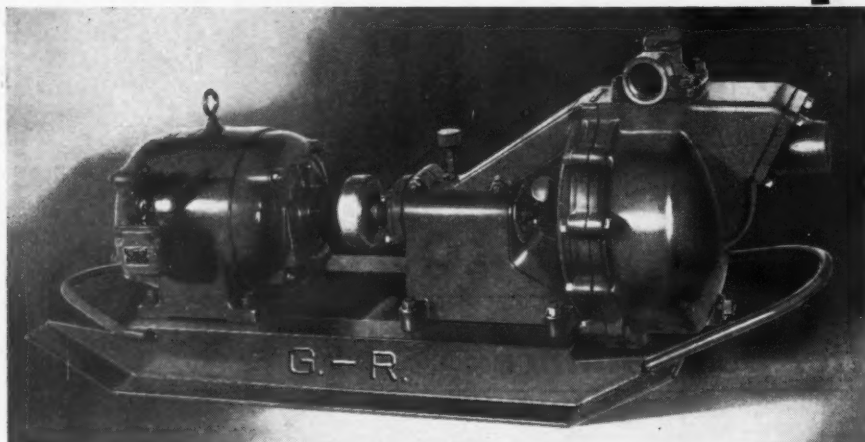
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THIS GORMAN-RUPP PUMP REQUIRES NO ATTENTION



**--IDEAL FOR REMOTE OR AUTOMATIC CONTROL
WHERE RELIABILITY IS DEMANDED.**

GORMAN-RUPP gathering pumps seldom need attention. They are completely and automatically self-priming. This action is so powerful that, on test, they have primed perfectly through 200 feet of dry, two-inch suction line. There is no adjustment between prime and run. No change takes place. There are no valves or gadgets to rob pumping efficiency. Gorman-Rupp pumps are the most simple, rugged, trouble-free units you can buy.

You never need to tinker with a Gorman-Rupp pump because of clogging. It will handle muck, sand, or any solids that will pass the intake strainer. These are fully discharged and do not remain in the case to require eventual removal.

The occasional service due to wear from water-born abrasives is done easily by an unskilled workman with common tools. All such wearing parts are readily and easily renewable.

For gathering service where absolute reliability and freedom from attention are essential, your best pump buy is Gorman-Rupp.

For additional information write for bulletin No. MP-2, or contact the nearest distributor listed below.

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a most favorable basis to attain it. We can't hope to make even a reasonable showing in coal production if miners go on a five-day week."

Neither the earlier estimates of anthracite requirements or production nor the over-all situation in regard to bituminous coal will be altered materially by the ending of the war with Japan, according to Mr. Ickes, who declared: "For the present we must continue to maintain certain controls over the distribution of solid fuels, including the 80 percent quotas established for the domestic heating sizes of coals produced in the East. However, we may be able to permit domestic consumers who can burn the so-called steam sizes of eastern bituminous coals to have 100 percent. We probably can avoid reinstating the 80 percent quotas for the mid-western coals and there will be no restrictions on the coals produced west of the Mississippi River."

Of oil and gasoline there is plenty, the administrator said, together with facilities for supplying high-octane for any expanded program of civil aviation. Sooner or later, however, he added, the question "whether it is wise to use for fuel so valuable a commodity as oil when coal is available to serve the purpose just as well" would present itself and was even now something to think about.

Sahara Establishes Mining Scholarships

A scholarship fund to be known as "The Sahara Coal Co. Scholarship," established by the Sahara Coal Co., Chicago, has been formally accepted by the University of Illinois, Urbana. Of the nine scholarships, four are for undergraduates and are for four years; four are for master's degrees for a one-year course, and one is for a three-years' doctor's degree. The awards are to be made under recommendations of the Department of Mining and Metallurgical Engineering. When there are more applications than scholarships, all other things being equal, the committee will give preferential consideration to applicants from Saline County, Illinois, in which the Sahara mines are located, and to applicants whose fathers are now or were formerly employed by the Sahara Coal Co.

In formally announcing these awards on behalf of the Sahara Coal Co., Chairman Henry C. Woods said:

"Never in the history of our nation has there been a greater demand for scientifically trained men than there is today, and particularly during the war years have we been woefully negligent in providing for the future. For example, after the war we shall need 35,000 more doctors than will be available, and the dearth of other specially trained men is almost in proportion. In a survey of 116 universities and colleges, placement officers reported that from three to ten positions await every available graduate.

"In a recent report, Dr. Gustav Egloff, noted scientist, asserted that through sending technical students into war service the United States has lost 150,000 potential scientists in the past three years and indi-



To Men Who Know Motors

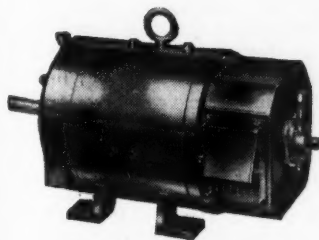
... we could end
our message here!

To men who know motors, a picture like this is worth the proverbial ten thousand words. It speaks with convincing eloquence of craftsmanship to which any motor builder could point with pride.

If you visit Star's modern plant, you'll see scores of examples of the same painstaking craftsmanship that pays off in outstanding performance for Star customers.

Star not only builds motors well, but also takes leadership in design. Star pioneered ball bearing motors . . . led in welded steel construction . . . developed the famed Star Built-in Magnetic Disc Brake for motors . . . pioneered in the field of gear-motors.

Whether you need special or standard motors, $\frac{1}{8}$ to 200 H.P., it will pay to learn why so many critical buyers specify "Star". Some standard motors are ready for early delivery. Star Electric Motors Co., 200 Bloomfield Avenue, Bloomfield, N. J.



Integral HP Motor
for Direct Current



STAR MOTORS

POWER PACKAGED AS YOU NEED IT

GOODALL CONVEYOR BELTING

*...Quality Construction That
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"SSS" . . . for super-severe service . . . hauling ores, run-o'-mine coal, crushed limestone up to 8", rough slag, etc. Backed by a reputation for outstanding performance in mining, quarrying, construction.

"GOODALL" Brand . . . recommended for lighter materials, such as sized coal, dry crushed stone, gravel, ashes, cinders, etc.

Contact our nearest branch or main office for details and prices on these and other products by GOODALL . . . hose, belting, boots, clothing . . . "On the Job LONGER."

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GOODALL RUBBER CO. OF CALIF.
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GOODALL RUBBER CO. OF TEXAS
Established 1870

cations are that another 100,000 will be lost in the next two years.

"The atomic bomb was developed through a backlog of U. S. scientists trained before the war, but unless steps are taken at once to return men to school, we will likely not have this backlog for future crises.

"During the past 25 years, coal has made phenomenal progress in the world of science. Nylon, the sulfa drugs and innumerable other history-making discoveries have been made by scientists using coal as their basic ingredient. To help develop further and as yet perhaps undreamed uses for coal, as well as to produce the maximum of efficient heat and power with coal, these Sahara scholarships have been established."

Coal Publications

Significance of Criteria of Coal Plasticity, by H. H. Lowry and C. O. Junge Jr., Coal Research Laboratory, Carnegie Institute of Technology. Contribution No. 115, 6 pp., 6x9 in.; paper. Plasticity indexes obtained with Davis and Gieseler plastometers closely parallel those to be derived from proximate coal analyses. Physical properties of cokes from coals can be prognosticated equally well from either type of determination.

Reactivity of Solid Fuels, by A. A. Orning, Coal Research Laboratory. Con. No. 116, 9 pp., 6x9 in.; paper. Reactivity indexes, which vary inversely with reactivity, correlate with volatile content on a dry ash-free basis.

Ultraviolet Absorption Spectra of Hydrocarbon-Trinitrobenzene Complexes, by R. C. Jones and M. B. Neuworth, Coal Research Laboratory. Con. No. 117, 6 pp., 6x9 in.; paper. Aromatic hydrocarbons can be identified by their ultraviolet absorption spectra. As substituting an alkyl group or an alicyclic ring does not alter significantly the spectrum of the aromatic ring system, ultraviolet absorption spectra are valuable identification tools.

Alkaline Permanganate Oxidation of Certain Condensed Cyclic Compounds Including Coal, by J. J. Ward, W. R. Kirner and H. C. Howard, Coal Research Laboratory. Con. No. 118, 18 pp., 6x9 in.; paper. Oxidative degradation and hydrogenolysis demonstrate that coal is primarily composed of carbocyclic structures and comprises unreduced benzene rings linked through side-chains or oxygen heterocycles and fused reduced rings probably are not present to any great extent.

Practical Management Research, by A. R. Wiren and C. Heyel. McGraw-Hill Book Co., 222 pp., 5½x9 in.; cloth; price, \$2.50. Principles of a systematic solution of management problems with some examples of its application in general industry.

Hazards of the Trolley-Locomotive Haulage System in Coal Mines, by D. Harrington and R. G. Warncke, U. S. Bureau of Mines. I. C. 7328, 38 pp., 8x10½; mimeograph, free. Declares, despite investment in about 50,000 miles of underground trol-

HARD ON THE WORK . . .
EASY ON THE WORKER



TWO-FISTED STRENGTH
WITH



FINE TOOL *Precision Balance...*



BIG FIST

ALLOY GRADE

COAL SHOVELS

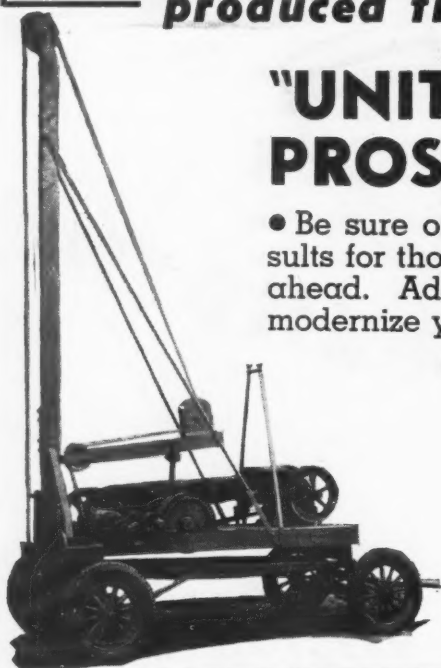
These great super-service shovels, specially designed to meet the precise requirements of experienced coal miners, are brutes for big, two-fisted strength and durability, yet so finely balanced as to be extra easy to work with. Result—Miners using BIG FIST Coal Shovels get out more work and better work with less fatigue.

THE WOOD SHOVEL AND TOOL CO.
PIQUA, OHIO

A National Organization Specializing
Exclusively in Shovels, Spades and Scoops.

MANGANESE ALLOY STEEL SHOVELS

**Years of actual field experience
produced this**



"UNITED" Portable PROSPECT DRILL

• Be sure of dependable low cost results for those operations immediately ahead. Add the "UNITED" to fully modernize your coal prospecting jobs.

Manufacturers of

- 6 to 50 ton trailers
- coal pinning machines
- coal crushers
- pick breakers
- vibratory screens
- conveyors
- feeders
- loading booms
- shaking screens

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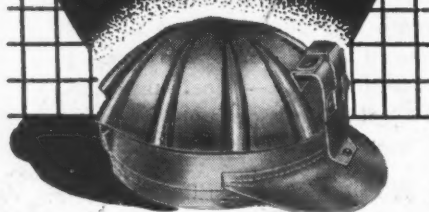
UNITED IRON WORKS COMPANY

ENGINEERS • FOUNDERS • MANUFACTURERS.
PITTSBURG Trailers, and Coal Mine Equipment KANSAS

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"Cool Cap" and
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HELP AVOID
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PORTABLE
SAFETY DIVISION

PORTABLE PRODUCTS CORPORATION
420 Blvd. of the Allies, Pittsburgh 19, Pa.

ley roads in the United States, trolley haulage should be superseded by some far safer system. Details ways in which trolley locomotives have caused accidents, fires and disasters and means by which such hazards, which cause 4 to 5 percent of the total fatalities in U. S. coal mines—460 fatalities and 3,964 non-fatal accidents in 13 years—may, in part, be circumvented, without discarding the trolley locomotive and its adjuncts.

Mine Fatality Rate Recedes Sharply

Accidents at coal mines of the United States caused the deaths of 62 bituminous and 14 anthracite miners in June last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors.

With a production of 51,590,000 net tons, the accident death rate among bituminous miners in June last was 1.20 per million tons, compared with 1.68 in the preceding month and 1.63 in June, 1944.

The anthracite fatality rate from accidents in June last was 2.48, based on an output of 5,634,000 tons, against 0.94 in the preceding month and 2.16 in the sixth month a year earlier.

For the two industries combined, the accident fatality rate in June last was 1.33, compared with 1.65 in the preceding month and 1.68 in June, 1944.

Fatalities during June last, by causes and States, as well as comparable rates for the first six months of 1944 and 1945, were as follows:

U. S. COAL-MINE FATALITIES IN JUNE, 1945, BY CAUSES AND STATES

State	Underground										Grand total
	Falls of Roof	Falls of Face	Haulage	Explosives	Electricity	Machinery	Total Underground	Shaft	Open-cut	Surface	
Arkansas.....	..	..	..	..	..	..	2	..	1	..	3
Illinois.....	1	..	..	3	..	..	4	..	1	..	5
Indiana.....	..	1	..	..	..	..	11	..	..	..	11
Kentucky.....	3	..	1	1	1	..	6	..	1	..	8
Ohio.....	..	..	..	..	..	..	3	..	..	..	3
Penna. (bituminous).....	..	..	1	1	..	2	4	1	..	1	6
Tennessee.....	..	..	..	..	..	..	3	..	..	..	3
Virginia.....	..	..	1	..	..	..	1	..	..	..	1
Washington.....	..	1	..	..	..	..	1	1	..	..	2
West Virginia.....	11	1	8	1	1	..	22	..	..	3	25
Wyoming.....	..	..	1	..	..	..	1	..	..	1	2
Total bituminous.....	24	2	12	6	4	2	50	2	5	5	62
Penna. (anthracite).....	6	1	5	1	..	..	13	..	..	1	14
Grand total.....	30	3	17	7	4	2	63	2	5	6	76

DEATHS AND FATALITY RATES AT U. S. COAL MINES, BY CAUSES OF ACCIDENTS*

Cause	January-June, 1944 and 1945								Total			
	Bituminous				Anthracite				Number Killed		Killed per Million Tons	
	1944	1945	1944	1945	1944	1945	1944	1945	1944	1945	1944	1945
Underground:												
Falls of roof and coal...	289	196	0.909	0.661	44	27	1.330	1.004	333	223	0.949	0.690
Haulage.....	115	101	.362	.341	13	14	.393	.521	128	115	.365	.356
Gas or dust explosions:												
Local.....	6	9	.019	.030	1	1	.030	.037	7	10	.020	.031
Major.....	16	39	.050	.132	..	..	..	..	16	39	.045	.121
Explosives.....	4	13	.012	.044	10	4	.302	.149	14	17	.040	.052
Electricity.....	17	10	.054	.034	2	..	.061	..	19	10	.054	.031
Machinery.....	18	22	.057	.074	..	2	..	.074	18	24	.051	.074
Shaft.....	4	5	.012	.017	2	1	.080	.037	6	6	.017	.018
Miscellaneous.....	19	4	.060	.013	10	7	.302	.260	29	11	.083	.034
Stripping or open-cut.....	13	14	.041	.047	3	2	.091	.074	16	16	.046	.049
Surface.....	26	27	.082	.091	6	6	.181	.223	32	33	.091	.102
Total.....	527	440	1.658	1.484	91	64	2.750	2.379	618	504	1.761	1.558

*All figures subject to revision.

THE TOUGH CABLE FOR TOUGH SERVICE

Collyer PORTABLE CABLE

HEAVY DUTY RUBBER SHEATHED

Hard blows, reeling and unreeling, heat and abrasion are all in the day's work for Collyer Heavy Duty Rubber Sheathed Portable Cables. On cranes, elevators, electric shovels; for conveyors, dredges and excavating machinery—wherever abrasion, oil, grease and chemicals destroy ordinary cables—Collyer Rubber Sheathed Cables provide dependable, reliable service. Available in Single and Multi-conductor, Type W, Type G and other special constructions.

NOTE THESE OUTSTANDING FEATURES

- 1 Rope-stranded, tinned copper wires for desired flexibility... resist both tension and torsion.
- 2 Heat-resistant synthetic rubber insulation... safe for heavy overloads.
- 3 Multiple conductors cabled with jute fillers... flexible, easy to handle.
- 4 Rubber cushioning belt, highly resilient, with reinforcing open twine braid.
- 5 Lead-cured neoprene rubber sheath—dense, tough... resistant to flame, chemicals, oil and physical abuse.

Let us know your requirements

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Asbestos Wires & Cables • Rubber Cords & Cables • Rubber Covered Wires & Cables • Service Entrance Cables • Cablex — Non-Metallic Sheathed Cable • Varnished Cambric Insulated Cables.

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INSULATED WIRE CO.

285 Roosevelt Ave., Pawtucket, R. I.

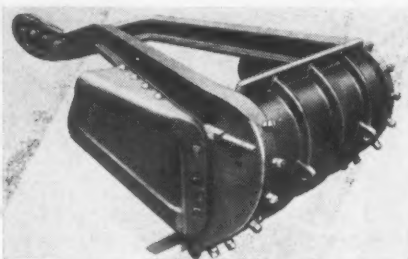




Equipment News

Box Scraper Buckets

American Manganese Steel Division of American Brake Shoe Co., Chicago Heights, Ill., offers a new line of manganese steel scraper buckets. Made in two types, the $\frac{1}{2}$ and $\frac{3}{4}$ box, these scrapers, it is said, feature high capacity, all manganese steel construction, simplicity of design, readily renewable scraper blades, curved backs and proper balance. The



curved back, it is reported, aids in quickly rolling up capacity loads.

The $\frac{1}{2}$ -box bucket is 30 in. wide and made with sides cast integral with the back. A wearing shoe protects the bail against abrasion wear. The $\frac{3}{4}$ -box bucket is 66 in. wide, 72 in. long over all and has removable 33-in.-long side plates. Wearing runners on the pulling bail, it is said, afford ample protection against abrasive wear.

All-Wheel-Drive Trucks

Marmont-Herrington Co., Inc., Indianapolis, expects to start production soon on new heavy-duty all-wheel-drive trucks for civilian purposes, concentrating on two models—MH555-4 and MH440-4. The larger, Model MH555-4, will be powered by a 131-hp. engine on a wheelbase of 161 in., with a permissible gross loaded weight of 27,000 lb. on 11x20 tires. Slightly smaller, Model MH440-4 will be powered by a 118-hp. engine on a wheelbase of 158 in., with a permissible gross loaded weight of 22,500 lb. on 10x20 tires. Both models will have ten forward speeds and four reverse.

Rust Inhibitors

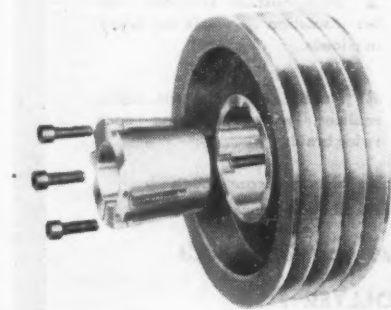
Two new types of specialized rust inhibitors have been developed by Carbozite Corp., Pittsburgh, Pa. Carbo "C" and Carbo "N" will readily meet the longfelt

need for temporary rust prevention on metal materials during inside storage, according to the manufacturer.

Carbo "C," the more universal of the two, is inactive on all metals and alloys, including magnesium and aluminum. Carbo "N" has no effect on iron, steel or ferrous alloys, although it does have a slight action on softer metals, such as lead, zinc, magnesium and aluminum. Besides preventing rusting of the metals to which they are applied while in inside storage, says the manufacturer, the inhibitors can also be used as a mixture with cutting oils to protect threads from rust.

V-Belt Sheave

Dodge Mfg. Co., Mishawaka, Ind., has released the Taperlock V-belt sheave, said to represent a new and effective means of quickly mounting and demounting V-belt sheaves. To install this sheave it is necessary only to slip the sheave and bushing assembly onto the shaft and tighten two or three locking screws, depending on the size of the sheave. The screws are in threaded engagement with the sheave hub and free in the bushing groove. As the screws are tightened, they



push against the tapered bushing, forcing it into the tapered bored hub. This causes the bushing to contract and wedge between the hub and shaft on which it is installed.

To remove the sheave from the shaft, the locking screws are removed and one or two of them are inserted in jackscrew holes, which are partially in the bushing and partially in the hub. The portion of the jackscrew hole in the bushing is threaded and that in the hub portion is unthreaded. As the screws are tightened, the bushing is dewatered and the sheave is free for removal from the shaft.

Metallizing Gun

Metallizing Co. of America, 1330 West Congress St., Chicago, has developed the new Mogul Model F metallizing gun. The new unit, it is said, will effect new economies in maintenance, production and corrosion-prevention spraying operations because of the increased efficiency and



higher spraying speeds which have been built into it.

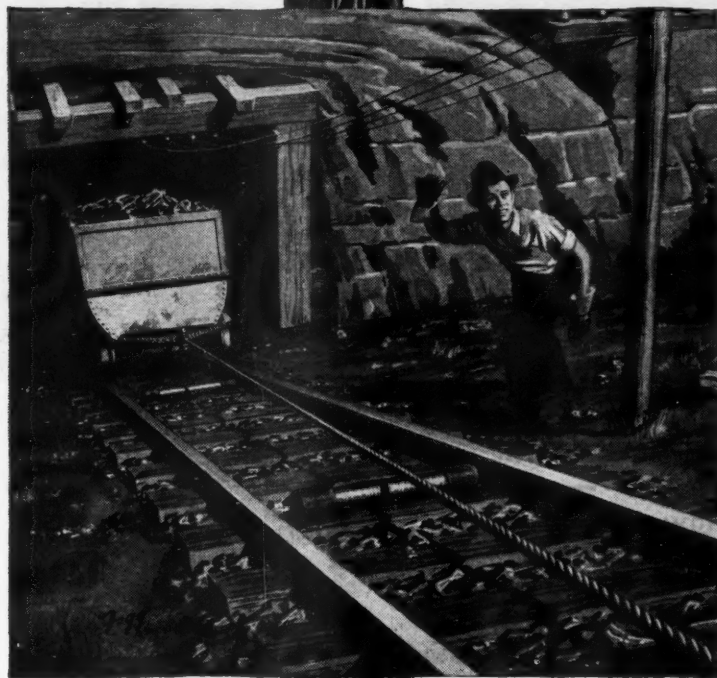
The new gun is lighter in weight, more streamlined in design, better balanced and much smoother in operation than previous models. Provision has been made to protect the working parts of the gun against dirt and foreign matter getting into the turbine housing when the gun is not in operation by screening the exhaust openings of the gun with a fine-mesh screen. Another important feature is that there are a minimum number of parts and the gun can be assembled or disassembled without the use of special tools.

Metal Spray Booths

Meallizing Engineering Co., Long Island City 1, N. Y., offers a complete line of spray booths and dust-collecting equipment designed expressly to handle metal spray dust. Intended as a solution to the problem of exhausting metal dust and reclaiming it for salvage, the line includes spray booths for exhausting to present exhaust systems, to the atmosphere or into a Metco wet collector. Featured in the line is a lathe exhaust unit that is mounted directly on the lathe carriage and moves with it. Also featured are wet collectors and water wash spray booths

J&L PERMASET

PRECISIONBILT PRE-FORMED WIRE ROPE



J&L PERMASET WIRE ROPE

Precisionbilt for Longer Wear and Lower Operating Costs . . . J&L Wire Rope for mining operations of all kinds is Precisionbilt to stand the severe abrasive conditions encountered and the speed to which cables are subjected. Made from J&L Controlled Quality Steel . . . by men of skill and experience . . . on machines of latest design . . . J&L Precisionbilt Wire Rope affords you extra safety . . . longer wear . . . lower operating costs.

**J&L
STEEL**

JONES & LAUGHLIN STEEL CORPORATION

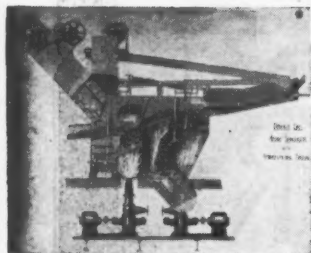
GILMORE WIRE ROPE DIVISION

PITTSBURGH 30, AND MUNCY, PENNSYLVANIA

J&L PERMASET

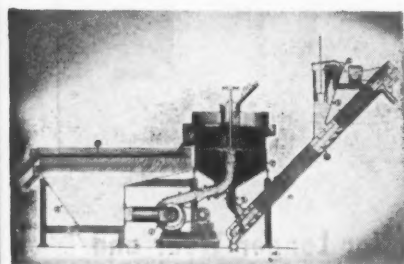
PRECISIONBILT PRE-FORMED WIRE ROPE

PRODUCE *Better Coal* AT LOWER COST... WITH R and S MODERN EQUIPMENT



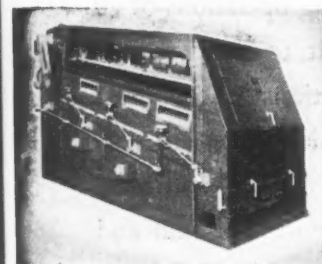
For all coarse coal washing ▼ **HYDRO-SEPARATOR** IMPROVED LAUNDRER TYPE

A product of painstaking engineering and long, intimate knowledge of production problems, the Hydro-Separator is known wherever coal is mined, as an exceptionally well built, efficient unit.



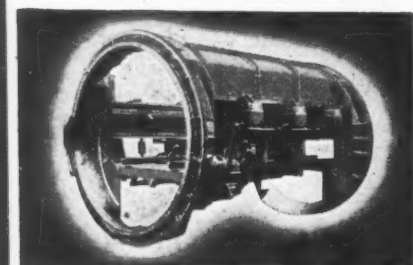
For low cost washing of fine coal... ▼ **The HYDROTATOR**

This is the effective way to wash fine coal and get increased recovery of marketable coal from sludge and refuse. Low cost efficiency is built into the Hydrotator.



For dry cleaning fine coal ▼ **STUMP AIR-FLOW**

Experienced operators know Stump Air-Flow—know it for its simplicity and dependability, for its sturdy construction. It cleans, dries, dedusts in one operation.



Handles any size and type of car ▼ **ROTARY CAR DUMPER**

Faster dumping, easy handling, unique safety features, reduced labor cost and minimum degradation—these advantages make the R and S Car Dumper the outstanding leader, Electric and Pneumatic types.

Bulletins describing these well designed, dependable units are modern "must" literature. Sending for them is a wise step—no obligation, of course. Simply refer to the product name.

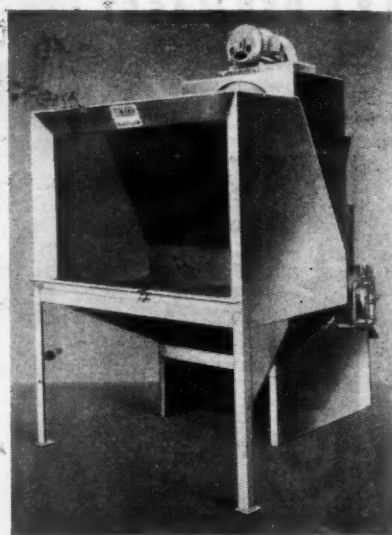


ROBERTS and SCHAEFER CO.

307 North Michigan Avenue, Chicago

P. O. Box 865.
PITTSBURGH, PA.

P. O. Box 570
HUNTINGTON, W. VA.



that gather metal particles in a sludge sump where valuable dust may be reclaimed for salvage.

Metco spray booths include such advantages as sloping rear wall that eliminates eddies and recirculation; open-type work table, down draft, dust trap and clean-out door. Complete line described in Bulletin 43A, available on request.

Welding Electrode

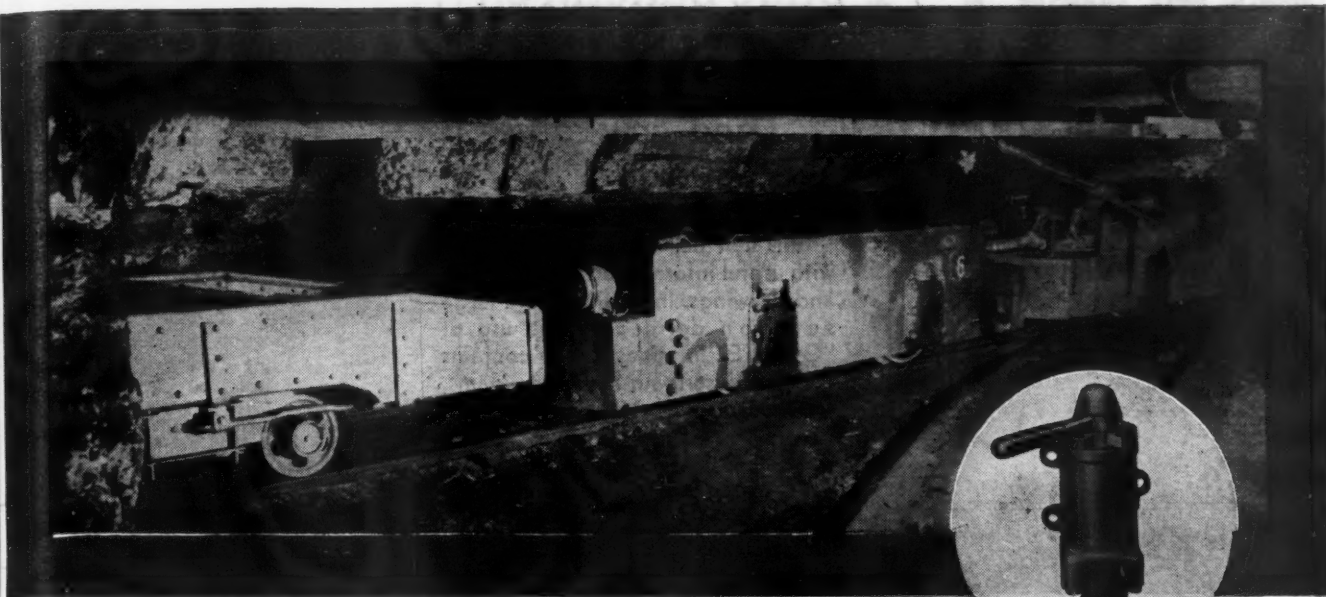
A new combination type welding electrode, Airco No. 315, designed to produce horizontal fillet welds with flat or slightly concave profiles and concave fillets in the flat position, as well as satisfactory deep fillet and deepgroove, is offered by Air Reduction, 60 East 42d St., New York 17.

With the new electrode, the thick porous slag that completely covers the weld deposit under practically every condition is readily removed, it is stated. The electrode may be used with conventional technique, employing normal currents, under which conditions medium penetration is obtained. Deeper penetration is obtained, however, when the deep fillet technique is used with the high currents recommended for this procedure. The No. 315 may be used with either a.c. or d.c., straight or reverse polarity.

Range Finder

An instrument said to combine the features of an ordinary speedometer and those of a tachometer with the addition of instructions governing engine speeds is offered by the White Motor Co., Detroit, under the name Economy Range Finder.

Designed to help drivers in shifting gears, saving fuel, conserving trucks and making schedules, the Range Finder is described as a simple device to guide the driver in selecting the various transmission gears in which to operate under existing conditions. When the pointer crosses a white line at the outer end, it indicates that the recommended r.p.m. has been reached and that the driver should shift into the next higher gear. And when the pointer crosses a white line at the inner end, it suggests a shift into the next lower gear.

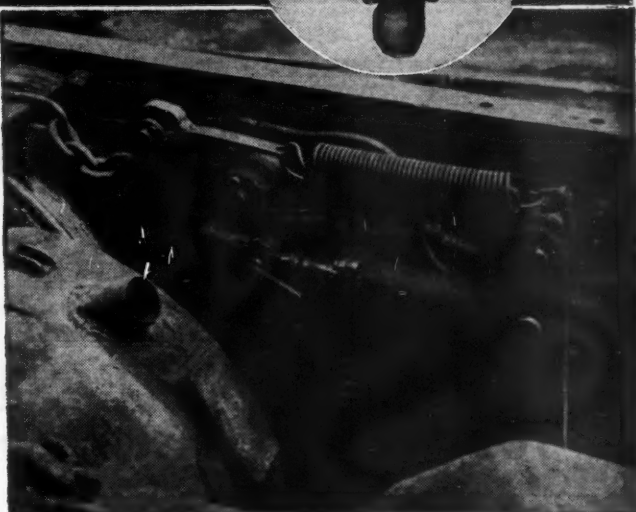


IMPROVE THE PERFORMANCE OF YOUR *tandem locomotives* with Westinghouse Hydraulic Brakes

You double the horsepower when you put mine locomotives in tandem . . . but that doesn't mean you double performance. To attain maximum utility and protection for equipment, adequate power braking must be provided. If a motorman must set two hand brakes, safe speeds on grades are reduced . . . stops are slower . . . car spotting takes more time. And there's always the temptation to use motor bucking to control trips, with consequent damage to expensive equipment.

Westinghouse Hydraulic Brakes can be easily and quickly applied to your locomotives in your own shops. All equipment items are small and compact, and utilize available space. Existing brake rigging is retained, and hand brake linkage can be retained if desired.

The comments of a Maintenance Foreman give a good picture of the many advantages of the brakes in



both operation and maintenance: greater safety in controlling trips; instant or gradual braking of both locomotives at the same time and utilizing the combined weight; shortest possible stops in emergencies; elimination of split pinions, broken axles and armature caps; less damage to coils and insulation; less burning of fingers and contact tips—all of which had previously resulted from motor bucking. And finally, the operators showed much more interest in taking care of their locomotives.

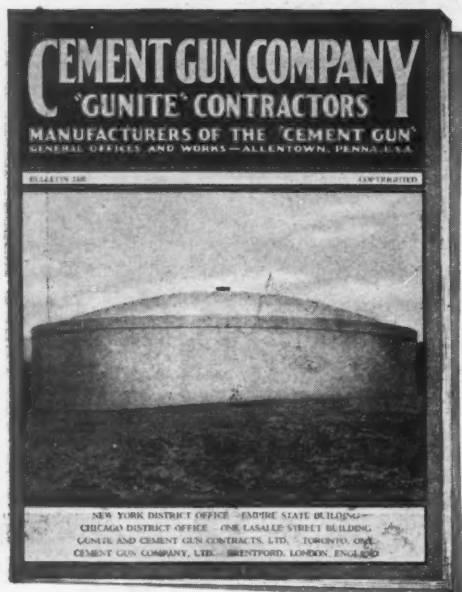
A reprint giving a detailed report on one installation will be sent you on request. Just drop us a line.

Westinghouse Air Brake Company
INDUSTRIAL DIVISION



General Offices: Wilmerding, Pa.

NEW! 72 page bulletin on .. "GUNITE"



... and how to use it PROFITABLY

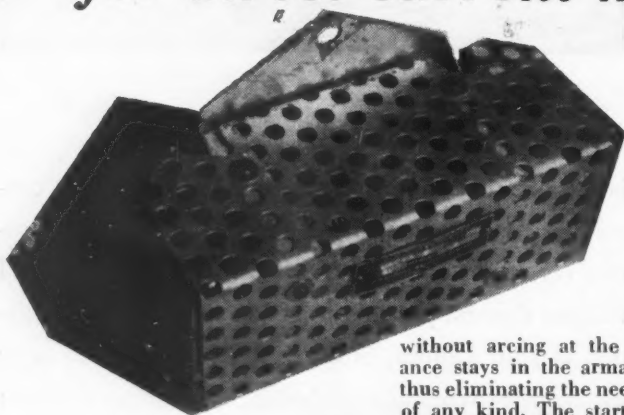
This new Bulletin D2300 is packed with useful information, photographs and drawings. In addition to a large section devoted to the use of "GUNITE" in mines it also contains sections describing repairs to dams, walls, bridges, buildings . . . "GUNITE" linings of pipe, canals, reservoirs, coal bunkers, stacks . . . building construction . . . construction of pre-stressed "GUNITE" tanks . . . protective encasement of structural steel and literally scores of uses you may be overlooking.

Write for your free copy of
Bulletin D2300 today.

CEMENT GUN COMPANY "GUNITE" CONTRACTORS

GENERAL OFFICES—ALLENTOWN, PENNA., U.S.A.

G. M. C. CHOKE STARTER for direct current motors

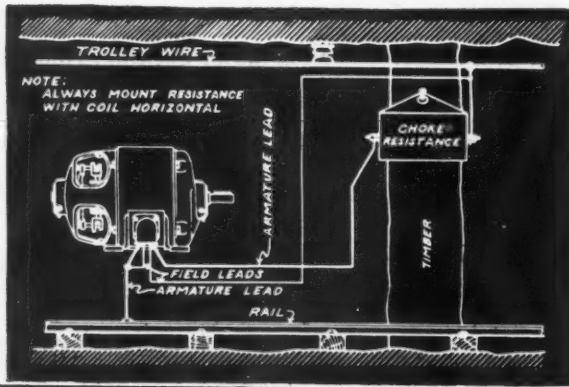


G.M.C. Choke Starters consist of a resistance coil, which connects in series with the motor armature. Resistance offered is sufficient to choke back the initial inrush of current when the motor is connected directly across the line . . . or when a circuit breaker has been out and recloses on the motor. This permits the motor to start smoothly

without arcing at the commutator. The resistance stays in the armature circuit at all times, thus eliminating the need for an automatic switch of any kind. The starter requires no operator.

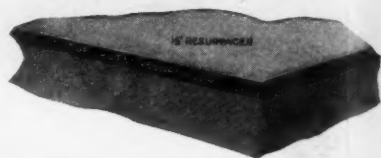
Write to GUYAN to-day . . . we'll be glad to send complete details.

GUYAN
MACHINERY CO.
LOGAN, W. VA.



Floor Resurfacer

Tufcrete Co., Des Moines 9, Iowa, offers Tufcrete resurfacer for use indoors or out on worn floors of wood, concrete, brick, asphalt, stone, etc., either for patching or a complete new surface. Tufcrete is described as an asphaltic-base liquid which, added to a concrete mixture, will bond to concrete, wood or



other floors, both bottom and edges, will feather-edge perfectly and stand up under heavy traffic. It is said to require no chipping of ruts or holes, no heating of materials, no expensive tools and can be installed by ordinary labor. Laid on Saturday, it is stated, it is ready for traffic on Monday. Six-page folder describing Tufcrete uses is obtainable from manufacturer.

Balancing Ways

Ideal Commutator Dresser Co., 1013 Park Ave., Sycamore, Ill., offers a new line of supersensitive balancing ways that are said to revolutionize static balancing operations. Through the use of scale-type bearings in the small 10-in. size, sensitivity to 0.007 oz. in. is made possible, it is said; special bearings in the 20- and 42-in. sizes permit accuracy to 0.009.

The work is carried, it is stated, on free turning disks mounted on precision bearings. Disks are ground on outside diameters mounted on ground spindles and balanced with extreme care. Standards supporting the revolving disks are movable on shafts to take different lengths of armatures within the capacity of the machine. Maximum strength and rigidity are obtained through the use of solid-end castings. Four sizes are available: 10-, 20-, 42- and 60-in. swing; 400, 1,000, 1,000 and 5,000 lb. capacity.

Diesel Oil Concentrate

Hood Refining Co., 152 N. Hamilton Ave., Greensburg, Pa., has added Gibraltar diesel fuel oil concentrate to its line of special oils and greases for industrial and commercial uses. Especially prepared as an additive to diesel fuel oils, (4 oz. to each 10 gal. of regular diesel fuel oil), the new concentrate is said to prevent the corroding and sticking of injector nozzles and at the same time give top cylinder lubrication, thus preventing the formation of hard carbon and sticking rings.

Gibraltar diesel fuel oil concentrate gives instant overhead lubrication, penetrates the pores of the metal and prevents hard carbon from adhering to the metal surface. Any carbon formed will be soft, and because the lethal pores are impregnated with oil capable of withstanding high temperatures the carbon will be ex-

Announcing KENNAMETAL DRILL BITS



Drilling is a major factor in better utilization of manpower and powerful strip mining machinery, particularly because the opportunities for digging overburden without shooting are becoming fewer as stripping goes deeper.

The effectiveness of drilling equipment depends upon the cutting edge of the bit. When the cutting edge is Kennametal—as demonstrated by scores of thorough, comparative field tests—more coal can be removed in less time at less cost.

Kennametal Drill Bits have brazed-in cutting tips of durable Kennametal—the cemented carbide that is exceptionally tough and hard (75 to 76 Rockwell C compared to 66 to 67 for the hardest tool steels). They can be fed faster with less power

consumption, will drill far more footage before resharpener is required, and can be reground many times. Their design assures continuous maintenance of hole gage, without over- or under-drilling.

Four sizes of these revolutionary new bits are now available for stripping operations, as listed in the table below. The bodies are heat-treated alloy steel castings, with bar-steel shanks, welded-in, of a shape and length to fit the sockets of the most common types of augers. A properly-shaped extension of the shank projects between the prongs to form an effective core breaker. Hexagonal shanks, as illustrated, are considered our standard. Alternate forms (square and splined) can be supplied on most sizes.

KENNAMETAL DRILL BITS*

Drill Diameter	Catalog Number	Purpose of Drilled Hole
3½"	D7	3" Powder Stick
4"	D8	3½" Powder Stick
5"	D9	4" or 4½" Powder Stick
6½"	D10	4½" or 5" Powder Stick

*Sizes listed have three prongs, and are intended primarily for stripping operations. Smaller sizes, designed for underground mining, have two prongs and are available in following diameters: 1½", 1¾", 1¾", 2¼", 2½" and 3".

For additional particulars on Kennametal Drill Bits, write for information, giving details of your operations.



TRADE MARK REG.
U. S. PAT. OFF.

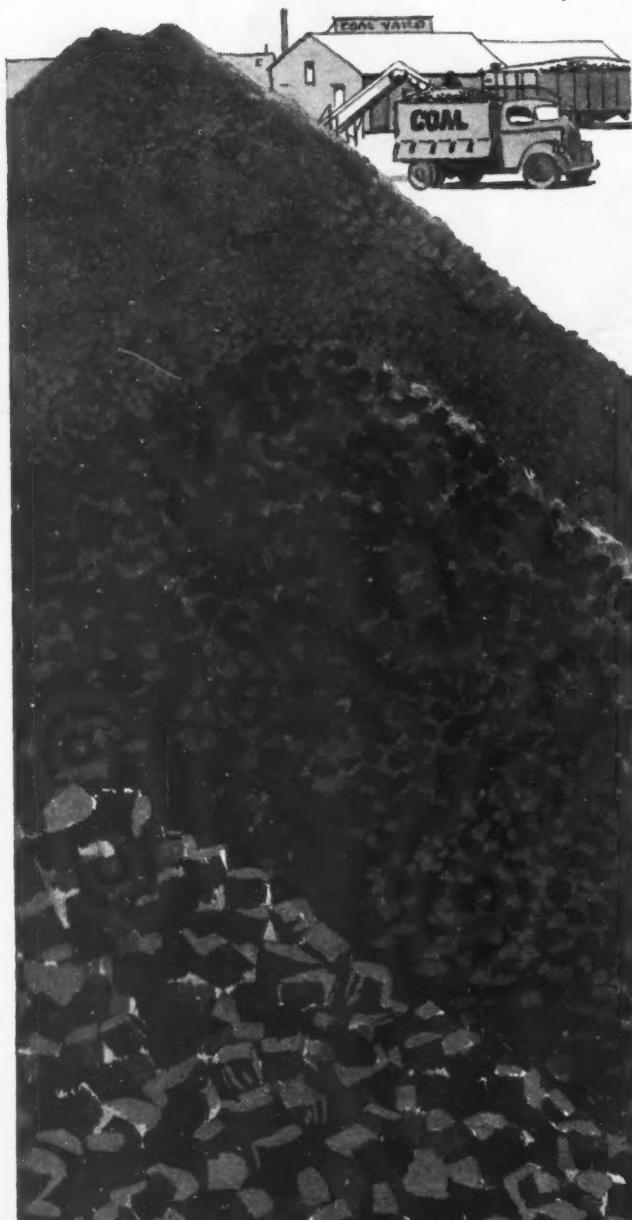
KENNAMETAL

SUPERIOR CEMENTED CARBIDES

KENNAMETAL Inc., LATROBE, PA.

NO DUST

NO FREEZING



SERVING BOTH HOME AND INDUSTRY

The benefits of freezeproofing and dust-proofing coal with calcium chloride go far beyond pleasing the housewife — yes, even beyond helping the dealer.

One industrial organization, which is treating its power plant fuel, points out that they:

Make sufficient savings of windage losses to pay for the treatment.

Make substantial labor savings in unloading costs during freezing weather.

Reduce damage to cars which occurs when coal is frozen solid.

Get substantially improved furnace efficiency and a much cleaner plant.

Yes, there is more to calcium chloride coal treatment than meets the eye. If you forget about pleasing housewives, about demurrage and dealer annoyance you will find many other advantages to coal users that make them ask for the calcium chloride dustproofing-freezeproofing treatment.

CALCIUM CHLORIDE ASSOCIATION

4145 Penobscot Bldg., Detroit 26, Mich.

DUSTPROOF AND FREEZEPROOF COAL with

CALCIUM CHLORIDE



pelled from the engine through the ports. The concentrate is manufactured from a light mineral-oil base and will mix thoroughly without agitation with any regular type fuel oil.

Brake Blocks

Raybestos-Manhattan, Inc., Passaic, N. J., offers the new patented Key-Lok brake block, said to possess quick replacement features. It consists of lateral fish-tail metal strips, or keepers, in which bolts are inserted, spaced to fit in the brake bands. These keepers slide into fish-tail slots cut into the block.

By this means, it is stated, the bolts, bands or shoes never need be removed for relining; all that need be done is to loosen the keeper nuts slightly, slide off the old and on the new, tighten the bolts and make the normal adjustments.

Fire Extinguisher

Extinguishing hot oil fires without danger of reflash is the function of the new Foamite Challenger 40-gal. engine offered by American-LaFrance-Foamite, Elmira, N. Y. It is said to produce 50 percent more foam than any other 40-gal.



foam engine ever designed, and delivers over 450 gal. of it in less than three minutes. It has a metering device, said to be an important factor in its foam-making function. Illustrated literature available on request.

Lathe File

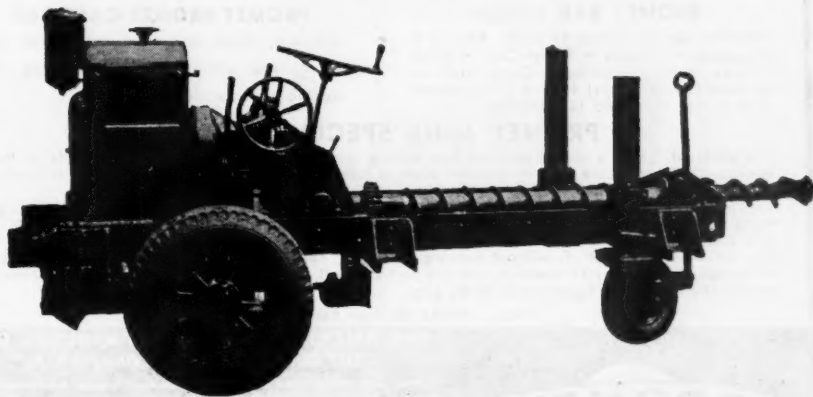
Kennametal, Inc., Latrobe, Pa., offers a new lathe file said to cut steels no ordinary file will touch, at speeds three to ten times faster than possible with steel files, with a life of fifty to two hundred times as long, and in addition provides longer filing surface; quick, easy blade replacement and greater handling convenience.

In this new design, the blanks have brazed-on nuts and are attached to the lightweight aluminum alloy handle by screws. Two types of blanks—fine (30

PARMANCO Horizontal Drills

"Positive Control Drilling"

Parmanco Horizontal Drills give you "Positive Control Drilling." Parmanco Vertical and Horizontal Drills are today's leaders in low cost, low maintenance drilling—All Parmanco Drills are equipped with patented Parmanco augers. Used by leading strip mine operators—Write us your drilling problems.



PARIS MANUFACTURING CO.
PARIS, ILLINOIS

Why let coal freeze in the car?

FREEZEPROOF IT WITH WYANDOTTE CALCIUM CHLORIDE

Frozen coal is costly. Cracking it takes time and labor. Cars and equipment, needed elsewhere, are tied up. Dealers get behind on delivery schedules.

You can easily avoid this expense, delay and inconvenience. Freezeproof your coal with Wyandotte Calcium Chloride. Then it will come out of the car readily—even in freezing weather—the same grade as it went in.

Let us tell you more about Wyandotte Calcium Chloride—the dependable,

safe and economical agent for treating coal. Just mail the coupon.

WYANDOTTE CHEMICALS CORPORATION
Michigan Alkali Division, Wyandotte, Mich.

Send me literature and further information about the uses and advantages of Wyandotte Calcium Chloride.

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Wyandotte
REG. U. S. PAT. OFF.

CALCIUM CHLORIDE

Wyandotte Chemicals Corporation • Michigan Alkali Division • Wyandotte, Mich.

DON'T MAKE THE MISTAKE OF THINKING ALL BEARING MATERIALS ARE ALIKE

Specializing in bronze bearings and bushings for coal mining equipment with specific formulae for each application. We guarantee superior service or your money back. Parts for Jeffrey, Goodman, Westinghouse, General Electric, Sullivan, Joy Equipment, etc.

PROMET BEARING BRONZES

Will not cut or stick to the shaft under normal conditions, nor powder under severe conditions. In emergencies can be run without lubrication at red heat, suddenly cooled, and returned to service without injury. Can be machined at over 500 feet per minute twice as fast as phosphor bronzes.

PROMET BAR STOCK

Machines easily. Cored or solid. Rounds • Hexagons • Squares • Rough Cast • Semi-finishes • Fully Machined. Cored stock in all sizes (by 1/4" steps) from a 1/2" minimum core to 12" O.D. and 12" lengths.

PROMET BRONZE CASTINGS

Any size, shape or section, up to 5000 lbs. ea. to your patterns. Pattern making, designing and machining service.

PROMET MINE SPECIAL BABBITT

It's different. Has a lead base and fine velvety grain. Withstands tremendous loads at high speeds. Will not score, cut or powder even in lubrication failures. The coefficient of friction is considerably less than that of tin babbitts, reducing power loss and wear. Entire bearing surface wears uniformly without pitting. Manufactured entirely from pure virgin metals, perfectly alloyed and heat-treated. Unaffected by moisture. Simply heat to 900°-950° F. and pour.

Can be heated to 2000° F. without burning or injury. Repouring only refines it. No appreciable shrinkage, hence a better contact with supporting shell, a more solid, rigid bearing. Contains practically no dross. Supplied in 10 lb. pigs.

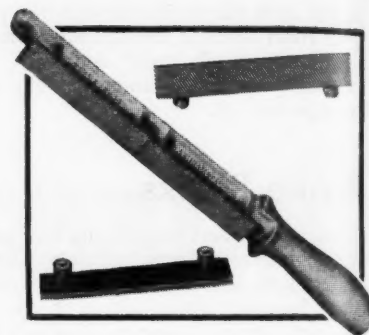
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THE AMERICAN CRUCIBLE PRODUCTS CO.
1307 Oberlin Ave., Lorain, Ohio, U. S. A.

Prompt delivery. Can usually be made from stocks maintained at:
REPALET, W. Va. The Universal Supply Co., Center 2nd Ave. and 2nd St. Phone 31-1
LORAIN, OHIO, The American Crucible Products Co. Phone 370-1
MILWAUKEE, W. Va. Wilmington Supply Co. Phone 12-08

Other Representatives:
ALTON, Ill. Frank E. Rupp, 323 East Ave. Phone 1100-1
BIG STONE, S.D. VIRGINIA C. P. Lamm Phone 1-1
KIMBERLY, N. J. O. D. Equipment Equipment Co. P. O. Box 1
CANTON, OHIO, B. & O. Equipment Co., Waynesburg Road Phone 2-1
MT. LEBANON, PA. J. E. Miller, 120 Railroad Ave. Phone 11-25
UNION, PA. Equipment Service, 1600 Street of Hope Phone 1-1



teeth per inch) and coarse (20 teeth per inch)—are available and are interchangeable on the same handle. The handle grip is shaped to fit the hand and has a thumb rest and knuckle guard. An extension beyond the filing surface supplies a convenient finger hold. One size is now available—the F-45, 13 1/2 in. long over all, with a filing surface 3/4 in. wide and 8 in. long.

Industrial Notes

ALLIS-CHALMERS MFG. CO., Milwaukee, announces that Lee H. Hill, vice president in charge of industrial relations since 1941, has resigned to join the McGraw-Hill Publishing Co. as publisher of *Electrical World* and *Electrical Contracting*. He was with A.C. since 1931, when the company took over American Brown Boveri, where Mr. Hill was manager of the transformer division. Prior to becoming vice president in charge of industrial relations he was assistant manager of the electrical department.

TIMKEN ROLLER BEARING CO., Canton 6, Ohio, has named as assistant general superintendent of the steel and tube division Gilbert Soler, hitherto superintendent of the quality control departments of the division.

OKONITE CO., Passaic, N. J., has appointed as vice president in charge of sales E. J. Garrigan, formerly vice president and factory sales manager. Joining the company in 1924 and now a director, he will direct all sales activities of Okonite, its Hazard Insulated Wire Works Division and the Okonite-Callender Cable Co., Inc. C. E. Brown Jr., formerly vice president in charge of the Washington (D. C.) office, has been appointed vice president and general sales manager.

CUTLER-HAMMER, INC., Milwaukee, has appointed F. A. Wright as assistant general sales manager. Associated with the company since 1927, he was in the St. Louis district sales office until 1939, when he was appointed manager of resale sales and transferred to the Milwaukee headquarters.

STANDARD OIL CO. (INDIANA) is organizing a chemical products department that will explore the market for petroleum chemicals, work with research and manufacturing departments in developing and producing marketable derivatives, and manage sales and distribution. The new department will operate under general

*A New Locomotive
Backed by
25 Years' Experience
in the Battery
Locomotive field!*

All Locomotives
CUSTOM-BUILT
to your requirements

FEATURES

Oil-tight, leak-proof transmission. Use regular auto oil; change every 6 months.

Strong. Simple. Low maintenance cost.

Extra-long journal springs assure better trackability.

Large motor, to assure more horse power per ton weight of locomotive.

Can be equipped with hydraulic brake.

MORE
HAULING
FOR LESS
STORAGE
BATTERY
CAPACITY

GREENSBURG "RANGER" STORAGE BATTERY LOCOMOTIVES

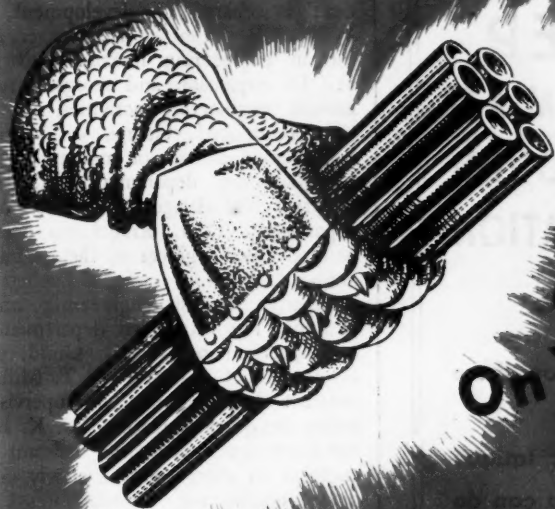


This locomotive being used for main line haulage at the Blacksmith Coal Company, Novinger, Missouri. This is a 4 1/2 ton locomotive, operating on 30" gauge track. This locomotive built from 3 1/2 to 10 tons — either single or double motor drive — 16" to 56 1/2" track gauge. Also factory rebuilt storage battery locomotives with new locomotive guarantee.

THE GREENSBURG MACHINE CO.

Makers of Custom-Built Storage Battery Locomotives

101 STANTON ST., GREENSBURG, PA.



Keep a Steel Grip On Your Clamp Problems



PIPE REPAIR CLAMP
Repairs pipe or tank leaks for
a few cents, in a few seconds.
No need to tear down or dis-
connect equipment.



PERFECT HOSE CLAMP
For all types of pressure suction
hose. Flat steel band cannot
cut hose cover.

Permanent—Easy-to-Use Economical

You can cut your maintenance worries and costs with **BAND-IT** Clamps. Three simple items—**BAND-IT** Tool, Steel Band, and Buckles—enable you to form pressure clamps of unusual strength and holding power in any diameter from ½ inch to 30 feet. With **BAND-IT**, you can apply clamps around any object in any location—can quickly repair leaky pipes, or clamp hose lines right on the job without disconnecting.

BAND-IT

INDUSTRIAL PRESSURE CLAMPS OF ALL DIAMETERS
FORMED FROM CONTINUOUS ROLL OF BAND-IT BAND



*Have you seen
the new
BAND-IT CLAMP
Warehouse?*

HOLDS 850

INDUSTRIAL PRESSURE
CLAMPS ANY DIAMETER
IN LESS THAN ONE
CUBIC FOOT OF SPACE



WRITE FOR FREE CATALOG GIVING FULL DETAILS

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INCORPORATED

2536 WALNUT STREET DENVER 5 COLORADO U.S.A.

Lee-Norse "MINE JEEP"

A SPECIAL FIVE MAN VEHICLE FOR UNDERGROUND PERSONNEL TRANSPORTATION



Gets you there
quicker . . .
without fatigue
. . . you can do
a better job.

USED
BY

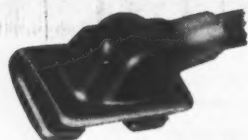
MINE OFFICIALS
MINE INSPECTORS
MINE REPAIRMEN
MAINTENANCE CREWS
MINE SURVEYING CREWS
RESCUE WORKERS
VISITORS AND OTHERS

We completely overhaul and fac-
tory rebuild various kinds of min-
ing machinery—cutters—loaders.

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Lee-Norse Company
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More Power - Less Labor - Longer Life



Type M8-F Terminal



Type M5-F Terminal

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Immediate Delivery—Phone HEmlock 8332

Flashwelded contact between cable and ter-
minal assures against voltage drop. Combination
joint and cross bonds reduces installation costs.
Oversize, drop-forged terminals made for
long life. Catalog shows 18
types. Write for it.

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FLEXIPIPE

The improved flexible tubing for
mine and tunnel ventilation

This flexible air tubing is ready for immediate, easy instal-
lation. On account of its flexibility, it can be put up or
taken down in a fractional part of the time required by a
more rigid means of face ventilation.

Write for free sample and full information.

BEMIS BRO. BAG CO.

412 Poplar Street, St. Louis 2, Mo.

direction of Bruce K. Brown, vice presi-
dent in charge of development, with
William B. Plummer as manager. Plans
for an engineering research department
and for expansion and reorganization of
present engineering activities also have
been announced. George W. Watts has
been named director of engineering of the
manufacturing department and D. A.
Munro, chief designing engineer of the
department. P. L. Krauel has been ap-
pointed chief engineer of the engineering
division, Whiting refinery, where the
company's largest engineering unit is
located. The oil design department will
be supervised by W. G. Guild, acting
assistant chief engineer. A. T. Milbrook,
assistant chief engineer, will supervise the
utility design department. W. K. Brown
has been appointed acting assistant chief
engineer in charge of the newly created
plant engineering department. C. E.
Dyckman is made assistant chief engineer,
estimating department, and will continue
to direct and supervise the work of the
estimating engineers. W. R. Burrows will
have charge of the newly created engi-
neering development department, with
the title of assistant chief engineer. D.
F. Purdy, assistant chief engineer, will
continue to supervise the drafting depart-
ment.

IRON FIREMAN MFG. Co. has promoted
C. D. Carter from division sales manager
of the southern division, Atlanta, Ga., to
manager of the central division with head-
quarters in Cleveland. This territory in-
cludes Ohio, Indiana, Kentucky, Michigan,
West Virginia and Pennsylvania. He is
being succeeded as southern division man-
ager by S. W. Alford.

WESTINGHOUSE ELECTRIC CORP. has
acquired the B. F. Sturtevant Co., Boston,
Mass., pioneer in the design and manu-
facture of air handling and processing
equipment. The Sturtevant company be-
comes a wholly owned Westinghouse sub-
sidiary, operating as the B. F. Sturtevant
Co., a division of Westinghouse Electric.
Frank C. Cline, special representative for
the Westinghouse Lamp Division at its
northwestern district headquarters at Chi-
cago, has been appointed acting manager
of the southwestern district with head-
quarters at St. Louis. He succeeds Dan
M. Galvin, who is entering private business
in Dallas, Texas. George S. Crawford suc-
ceeds Mr. Cline as special representative in
Chicago.

ROCHESTER ROPES, Culpeper, Va., has
elected Colonel Joseph P. Woodlock as
executive vice president, and he will take
over his new duties as soon as released
from his present assignment. Now asso-
ciate director of the Office of Surplus
Property in the Reconstruction Finance
Corporation, he was prior to this execu-
tive officer under W. L. Clayton in the
Surplus War Property Administration.

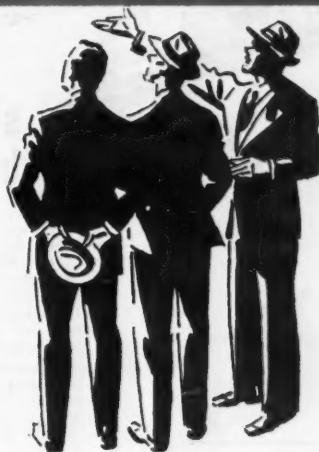
AMERICAN CAR & FOUNDRY EXPORT
Co. has elected as executive vice president
and director R. A. Williams, who also is
vice president in charge of sales of Ameri-
can Car & Foundry Co.

CERTIFIED ALLOY VALVE Co. has been

IF

YOU DON'T BELIEVE RED CROWN HAS WHAT IT TAKES...

Let us PROVE IT TO YOU...



When we say King's Red Crown is the greatest advance in mining explosives since Permissibles were introduced, we mean every word of it.

And we can *prove* every word, too. Just let us arrange a Red Crown demonstration in your mine—under your operating conditions—with you the sole judge of Red Crown's performance.

A trial will convince you that this Class A Permissible produces results similar to those obtained with black powder—distributes its power evenly throughout the face of the cut—displaces coal in firm, hard lumps—and is easy on the roof.

Give Red Crown a chance to do its stuff. Red Crown's action speaks louder than any words. See your Red Crown representative—or get in touch directly with us—and set a date for a demonstration that will show you what Red Crown can do for you.

THE KING POWDER CO., INC.
CINCINNATI 1, OHIO
INCORPORATED 1878

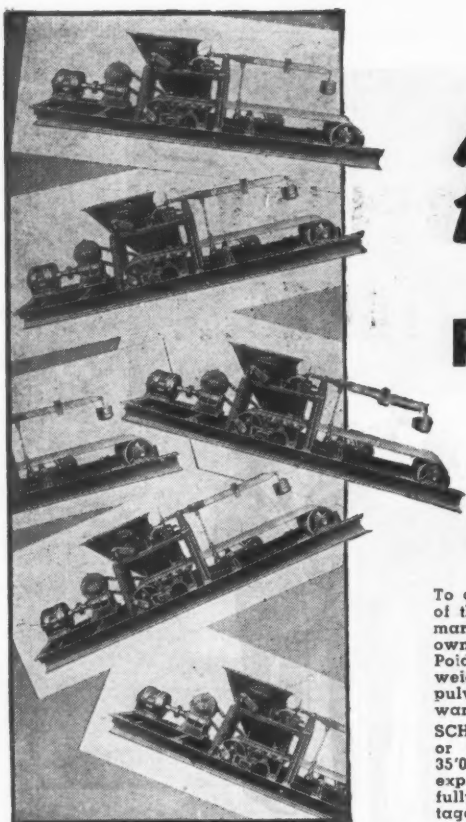


HERE ARE THE SIX MAJOR ADVANTAGES THAT RED CROWN OFFERS...

1. Slow heaving and spreading action with results similar to those obtained with the use of black powder.
2. Power distributed evenly throughout the face of the cut.
3. Coal displaced in firm, hard lumps with minimum of pin cracks.
4. Red Crown, containing no nitro-glycerine, is the non-headache Permissible.
5. Less smoke and fumes mean less idle time for expensive equipment.
6. Red Crown is easy on the roof.

RED CROWN

THE PATENTED, SURFACE-SENSITIZED PERMISSIBLE



Hundreds of **Schaffer Poidometers** are speeding preparation— sizing and blending throughout the U. S.

To gain greater production, assure uniformity of the coal you prepare for today's exacting market, do as hundreds of preparation plant owners have done — install SCHAFFER Poidometers. These units will size, blend, weigh and convey crushed, granulated and pulverized coal in exactly the proportions you want! Just set it . . . then forget it!

SCHAFFER Poidometers may be used singly or in batteries, with pulley centers up to 35'0", thus eliminating extra conveyors and expense. SCHAFFER Catalog #8 describes fully the construction, operation and advantages of these units. Write for your copy.

SCHAFFER POIDOMETER CO.

2828 Smallman St.,

Pittsburgh 22, Pa.

|| The Searchlight Section of this paper

features Employment, Equipment and Business Opportunities identified with the industry it serves.

"Searchlight" ads are referred to regularly by readers interested in such "Opportunities."

You can therefore bring "Opportunities" you have to offer to the attention of these readers quickly, and at small cost, through an advertisement in the Searchlight Section.

formed as a new division of the Cooper Alloy Foundry Co., Hillside, N. J. The new organization will specialize in the manufacture of stainless steel valves, for which it will furnish a certified analysis of every part that comes in contact with liquid. P. C. Shaffer is chief engineer. Products will be sold through Cooper.

INDUSTRY INVENTIONS, INC., an Ohio corporation, has been established to license the use of electronic vulcanization in the manufacture of rubber and plastic products according to an announcement by V. L. Smithers Laboratories, Akron. Smithers will be vice president and general manager of the new company. The B. F. Goodrich Co. and the Firestone Tire & Rubber Co. jointly hold patents for electronic processing of rubber and plastics and the new company will make the patents available to the rubber and plastics industries on a reasonable basis, Smithers said. The electronic method is said to require as little as one-eighth the time formerly required to vulcanize rubber and already is being used in the manufacture of many rubber and plastic products. Other officers of Industry Inventions, Inc., are: W. F. Avery, of B. F. Goodrich, chairman of the board; W. A. Fraser, of Firestone, president; H. S. Woodruff, of B. F. Goodrich, secretary; E. H. Schulenberg, of Firestone, treasurer, and E. J. Moyer, of Smithers Laboratories, assistant secretary. In addition to Avery, Fraser and Woodruff, C. W. Leguillon, of B. F. Goodrich; H. H. Waters and G. P. Bosomworth, of Firestone, comprise the board of directors.

R. G. LeTOURNEAU, INC., Peoria, Ill., has added Robert F. Nelson to its executive staff as vice president and assistant to the president. Former vice president and director of the Arma Corp., he will work closely with Denn M. Burgess, executive vice president, and Merle R. Yontz, vice president and treasurer. One of Mr. Nelson's first assignments will be to assist in establishing a new LeTourneau plant in England this autumn.

REPUBLIC STEEL CORP., Cleveland, has elected N. J. Clarke as senior vice president and J. M. Schlendorf as vice president in charge of sales. Mr. Clarke, who has been vice president in charge of sales since 1930, soon after the corporation was formed, will be succeeded in that position by Mr. Schlendorf, who has been assistant vice president in charge of sales.

AMERICAN CAR & FOUNDRY CO. has appointed as a special representative for the sales department E. A. Lofquist, a graduate of the U. S. Naval Academy and until recently on active duty as a captain in the U. S. Navy. His headquarters will be in the Chicago office.

CROCKER-WHEELER DIVISION, Joshua Hendy Iron Works, Ampere, N. J., has appointed E. G. Cross as supervisor of the production planning and control department. Formerly he was in the methods and procedures department of Merck & Co.; senior accountant at the California Shipbuilding Corp.; chief cost accountant

ANTI-FRICTION BEARINGS

*A good feature
to have in a*
**SHOVEL CRANE
or DRAGLINE!**

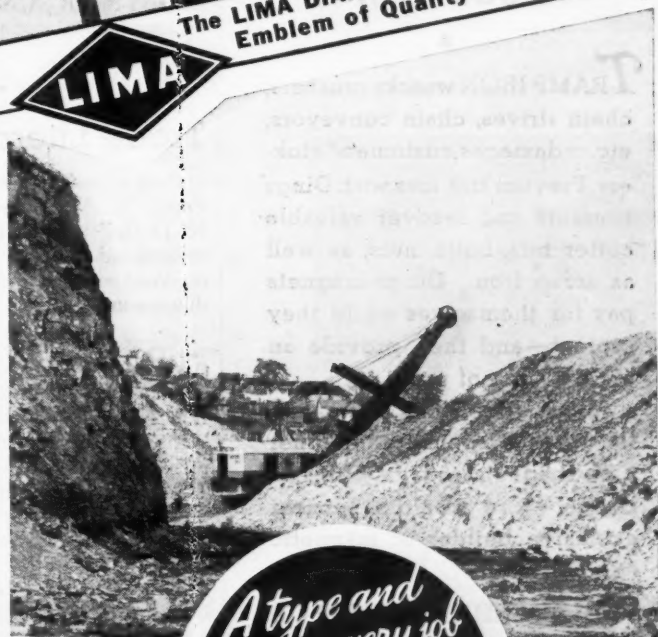
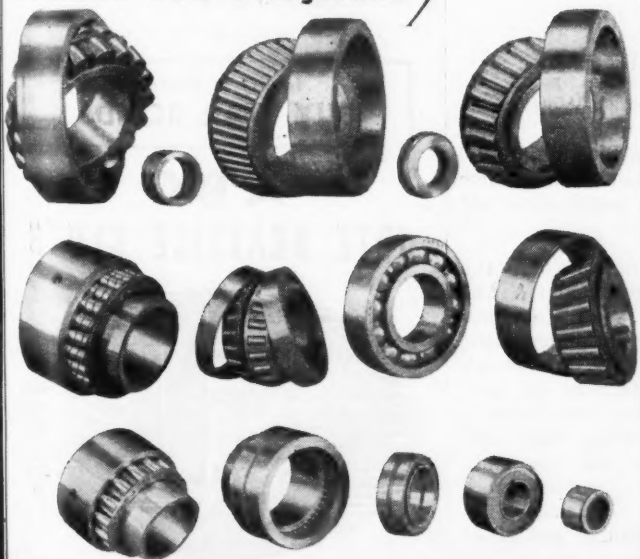
To get the full advantage of anti-friction bearings in a shovel, crane or dragline, the bearings must be applied to every important bearing point, not only on high speed shafts. Anti-friction bearings are the modern means of reducing friction. They transfer the sliding rubbing friction of a journal bearing into a rolling friction. A good demonstration of the difference may be had by first rubbing the palms of your hands together, noticing how warm they get, then take a round pencil or marble, and rolling it between the palms. Rolling motion starts easier than the sliding motion, therefore, less strains are imposed upon the various parts of the machine. In addition to effecting less bearing friction, anti-friction bearings also save oil, grease and fuel consumed by the engine, and that's not all - anti-friction bearings, when applied to the drums (as they are in a LIMA), hold the drums concentric to their clutch and brake, consequently the clutch and brake action is smooth, no chattering and grabbing. Remember, the more precise the machine the better the performance and the longer its life.

LIMA LOCOMOTIVE WORKS, INCORPORATED
SHOVEL AND CRANE DIVISION
LIMA, OHIO, U. S. A.

LIMA

The LIMA DIAMOND — For 75 Years an Emblem of Quality Workmanship

Various Types of Bearings
used in LIMA Shovels,
Cranes and Draglines



*A type and
size for every job*
CAPACITIES
SHOVELS, 3/4 Yd. to 5 Yds.
CRANES,
13 Tons to 100 Tons
DRAGLINES,
Variable

SHOVELS • CRANES • DRAGLINES

NEW YORK, N. Y.	CHICAGO, ILL.	NEWARK, N. J.	MEMPHIS, TENN.
ST. LOUIS, MO.	DALLAS, TEXAS	PORTLAND, OREGON	MINNEAPOLIS, MINN.
SAN FRANCISCO, CALIF.	SEATTLE, WASH.	LOS ANGELES, CALIF.	SPOKANE, WASH.
	MONTREAL, QUEBEC, CAN.	VANCOUVER, B. C.	



with **DINGS**
Magnetic Separators

1. **Save Machinery**
2. **Salvage Usable Parts**
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4. **Protect Customer Good Will**

TRAMP IRON wrecks crushers, chain drives, chain conveyors, etc.—damages customers' stockers. Prevent this loss with Dings magnets and recover valuable cutter bits, bolts, nuts, as well as scrap iron. Dings magnets pay for themselves while they protect—and then provide an extra source of profit.

Investigate Dings Drum, Pulley, Spout, Suspension and other type magnets today. Write to Dings—the world's largest exclusive builder of magnetic equipment.

DINGS MAGNETIC SEPARATOR CO.
506 East Smith Street
Milwaukee 7, Wisconsin

Dings
"HIGH INTENSITY"

and then chief of material control, Pacific Aviation, Inc.; production manager, Given Machinery Co.; chief cost accountant and contract officer, Western Pipe & Steel Co., San Pedro Shipbuilding Division.

MACK-INTERNATIONAL MOTOR TRUCK CORP. has appointed Ralph L. Tompkins as manager of the company's White Plains (N. Y.) branch. Recently transferred to inactive duty by the Marine Corps, he joined Mack in 1940 as a member of the general sales department, later becoming manager of the firm's branch at Mineola, L. I.

LIMA LOCOMOTIVE WORKS, INC., Lima, Ohio, has appointed these new distributors for shovels, draglines and cranes: Carroll-Edwards & Co., Richmond and McLean Sts., Cincinnati, covering southwestern Ohio, eastern Indiana and three counties in Kentucky; Construction Equipment Corp., 11-22 43d Ave., Long Island City, N. Y., covering southeastern New York, Long Island and Staten Island; Bill Goodwin Machinery Co., P. O. Box 2687, San Antonio, Texas, covering southern Texas; Reid-Holcomb Co., 370 South Illinois St., Indianapolis, covering all of Indiana except a few counties in the southeastern and northwestern portions; Southern Iron & Equipment Co., P. O. Box 2029, Atlanta, covering northwestern Georgia.

HEWITT RUBBER CORP., Buffalo, N. Y., has acquired about 90 percent of the stock of Robins Conveyors, Inc., Passaic, N. J. In addition to directing the management of Hewitt since 1936, Thomas Robins Jr., president, also has been chairman of the Robins Conveyors executive committee for the last five years.

ROME CABLE CORP., Rome, N. Y., announces that R. A. Schatzel has joined the organization as vice president and director of engineering.

Trade Literature

PORTABLE COMPRESSOR—Worthington Pump & Machinery Corp., Harrison, N. J. Bulletin describes Blue Brute 105' streamlined portable compressor, gasoline or diesel engine, giving specifications and dimensions.

ACCESSORIES FOR ROCK DRILLS AND AIR TOOLS—Worthington Pump & Machinery Corp., Harrison, N. J. Combination bulletin and price list covers pavement breaker tools, clay digger and trench digger tools, air-line lubricators, air hose, water hose and fittings, miscellaneous fittings, columns for drifting drills, universal column arms, air-line manifolds, tripods, mountings for hand-held rock drills, detachable bits, detachable rod bits and water-tank assembly and accessories.

HAULAGE—R. G. LeTourneau, Inc., Peoria, Ill. Folder Form TR-106 describes profitable hauling with Tournatrailer from shovel or dragline, showing how the Tournatrailer cuts the cost of hauling rock and other material and pointing the way to a wider range of



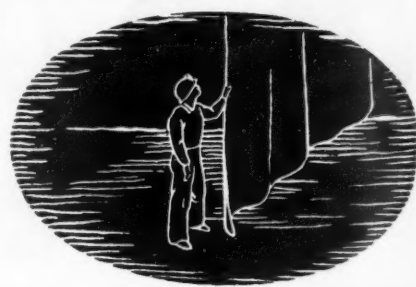
Rubber life rafts are most important life-saving equipment—but they've got to have air to serve their purpose most efficiently. To accomplish this, air tanks for quick inflation are supplied.

To get air to the boys at the working face, many mines use ABC JUTE BRATTICE CLOTH.

Adequate ventilation is vitally necessary to safe, efficient mine operation. Use American Brattice Cloth—closely woven construction cuts air-leaks to a minimum—special chemical treatment renders it abrasion, flame, and rot-proof. ABC can be moved easily—used over and over. Its surface is smooth, thus passing machinery or cars cannot pull it down or damage it. These features combine to assure proper ventilation at minimum cost—advantages that can be yours! Write today for complete information.

Invest in Victory
BUY WAR BONDS

ABC
JUTE BRATTICE CLOTH



AMERICAN
BRATTICE CLOTH CORP.
WARSAW - INDIANA



Ask your Maintenance man about *High Safety Factor* Electrical Insulation

Trouble-shooting maintenance men, whose primary jobs are to prevent shutdowns and to see that repairs make equipment as good as *or better* than new, will tell you that Fiberglas® Electrical Insulation Materials are the answer to many of their problems.

This better insulation material provides "extra" protection against the conditions which cause most motor burnouts. Impregnated Fiberglas has exceptional temperature, moisture and insulation resistance; high tensile, dielectric and impact strength; and an especially favorable space factor.

More and more design engineers, as well as maintenance men, are standardizing on Fiberglas-base Materials. They provide high *Safety Factor* insulation for electrical equipment which may be

subjected to such hazards as heat, dirt, moisture, corrosive acids, overloads and careless handling or operation. These are the conditions which frequently cannot be anticipated by the manufacturer, yet are among the chief causes of heavy time-and-dollar loss in nearly every industry.

APPLICATION DATA

There is a Fiberglas-base Material to meet virtually every requirement. Performance and application data, as well as facts about the various types of Fiberglas Electrical Insulation Materials are included in catalog EL 44-7. Write for your copy today and ask for the name of the supplier located nearest to you. *Owens-Corning Fiberglas Corporation, 1862 Nicholas Building, Toledo 1, Ohio.*

In Canada, Fiberglas Canada Ltd., Oshawa, Ont.

ASK FOR FIBERGLAS...IN YOUR NEXT NEW MOTORS...AND ON YOUR NEXT REWIND

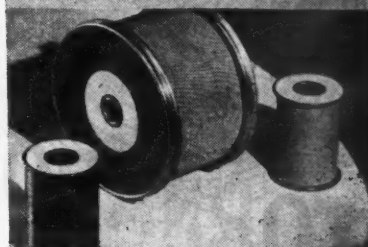
FIBERGLAS

*T. M. Reg. U. S. Pat. Off.

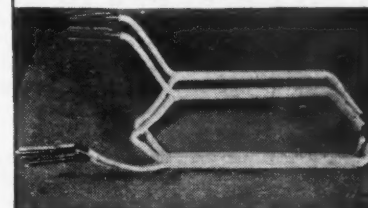


ELECTRICAL INSULATION MATERIALS

There is a
FIBERGLAS
Insulation Material
for every need



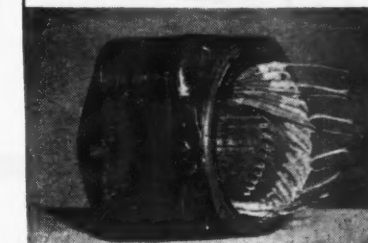
Fiberglass-insulated magnet wire in sizes from heavy # 0000 to fine # 42, and Fiberglass-insulated lead wires, both meet a wide variety of applications.



Treated or untreated Fiberglass Tape is used to insulate practically all sizes and types of coils.



Varnished Fiberglass Cloth is used for slot and phase insulation, high dielectric and high temperature coil form insulations, etc.



Fiberglass Treated Sleeving can be cut to short lengths without fraying. Single Saturated is also widely used on pigtail brush leads, leads on small armatures, single transformers, etc.



Write for catalog EL 44-7, today.



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PORTABLE
ELECTRIC BLOWER

reduces
DUST DANGER

BLOWS clean, dry air, at 295 m.p.h. Cleans out motors, generators and hard-to-get-at places—removing dust, dirt, lint and chips. Costs less than 3c an hour to operate. Reduces damage to motors and bearings—lessens fire and health hazards.

1 H.P. universal G.E. motor. Weight, 14 lbs. Portable to any place in plant. Plugs in at convenient outlets. Adaptable as Sprayer for spraying paint and insecticide. Convertible into powerful industrial Vacuum Cleaner—for cleaning floors, walls, ceilings, etc.

Free Trial—Write to
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5098 N. Ravenswood Ave., Chicago 40



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PORTABLE ELECTRIC BLOWER

HERCULES

Augers

HERCULES AUGERS

Ideally suited to modern high speed drills— withstand whips and torsional strains. May be resharpened—outlast four to five ordinary drills. Sizes available up to 3" diameters—lengths up to 16 ft.

BLACK DIAMOND AUGERS

Made from high-carbon crucible grade steel—heat treated to insure as much toughness and hardness as possible and to prevent broken tangs and points. Available in diameters up to 2"—maximum over-all lengths, 16 ft.

STANDARD AUGERS

Developed originally for use with hand drills. These augers recommended for hand drilling, drilling under stumps, and ditch blasting. Diameters up to 2" from oval steel, 1/16" thick, maximum length ten feet.

SALEM TOOL COMPANY
SALEM OHIO

work through Tournapull interchangeability with Tournatrucks, Tournatrailers, Tournacranes and Carryalls.

PIPE COUPLINGS—Drinkwater, Inc., 2323 South Wabash Ave., Chicago. Bulletin describing new line of Presto-Lock flexible pipe couplings points to the many applications and graphically illustrates the simplicity of coupling parts, giving complete engineering data, drawings and specifications on the eleven sizes from 1 1/4 to 16 in.

CATALOG ON GUIDANCE MANUALS—Elliott Service Co., Dept. 55, 219 East 44th St., New York 17. Describes guidance manuals by Glenn Gardiner, written to help foremen, supervisors and department heads meet current and future employee relations problems, now and during reconversion and competitive post-war production. Titles of supervisor aids are: "How to Handle Grievances," "Qualities of a Good Boss," "How to Correct Workers," "How to Train Workers Quickly," "How to Cut Waste," "How to Create Job Satisfaction" and "How to Get Out More Work." Sample set free to executives in charge of 15 or more supervisors.

FIREFIGHTING—General Detroit Corp., 2270 East Jefferson Ave., Detroit 7, Mich. Pocket-size book, 32 pp., on "How to Put Out a Motor Vehicle Fire" gives simple, concise instructions on what to do when fire breaks out—how to handle ignition fires, gasoline fires, fires in the interior of the car, under the hood and under the car itself; also simple rules to follow in preventing motor vehicle fires. Complete I. C. C. safety regulations likewise are included.

CORE DRILLS—Acker Drill Co., Scranton, Pa. Bulletin 25 describes the rotary core drill, its value in mineral development, its accessories and how to use it.

CRUSHERS—McLanahan & Stone Corp., Hollidaysburg, Pa. Catalog DR 447 traces the origin, development and use of double-roll crushers, emphasizing their adaptability and giving specifications and dimensions.

COAL PREPARATION—American Cyanamid Co., 30 Rockefeller Plaza, New York 20. Leaflet 401, "Ore Dressing Notes" 13, describes the application of heavy-media separation processes to the preparation of coal, giving the results of tests on carload samples of both bituminous and anthracite.

COAL-FIRED HEATERS—Dravo Corp., 300 Penn Ave., Pittsburgh, Pa. Two bulletins give specification data on direct-fired heaters, one series with top-mounted fans, pull-through type, and one series with floor-mounted fans, blow-through type. Stoker-fired, self-contained and having the Dravo non-clinkering air-cooled setting, they are available for bituminous, anthracite or lignite coal and applicable to a wide variety of heating, drying and processing problems.

CONCRETE MIXERS—Kwik-Mix Co., Port Washington, Wis. Catalog describes

Relax in Cool Comfort



HOTEL

Mayfair

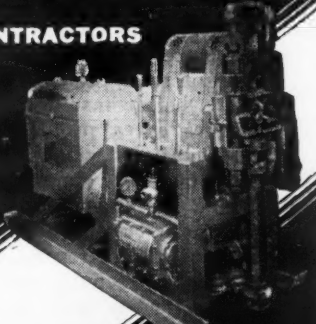
Saint Louis

AIR-CONDITIONED

MOTT

DIAMOND CORE DRILLING

CONTRACTORS



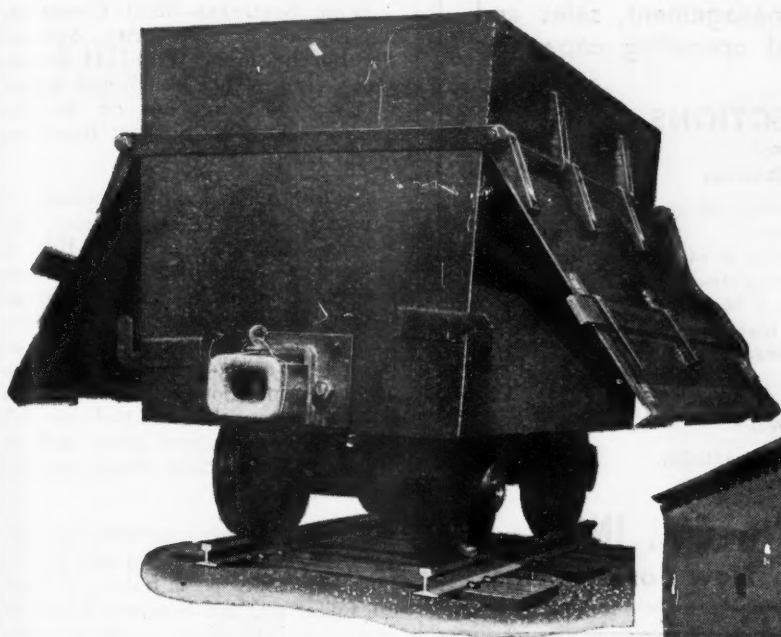
Mott Type "A" Oil Hydraulic 1500 Ft. Cap. 2 1/4" Diameter Core.

- Coal and all mineral properties tested—using our light gasoline drills. They save fuel and moving costs... guarantee satisfactory and proper cores.
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HUNTINGTON • WEST VIRGINIA

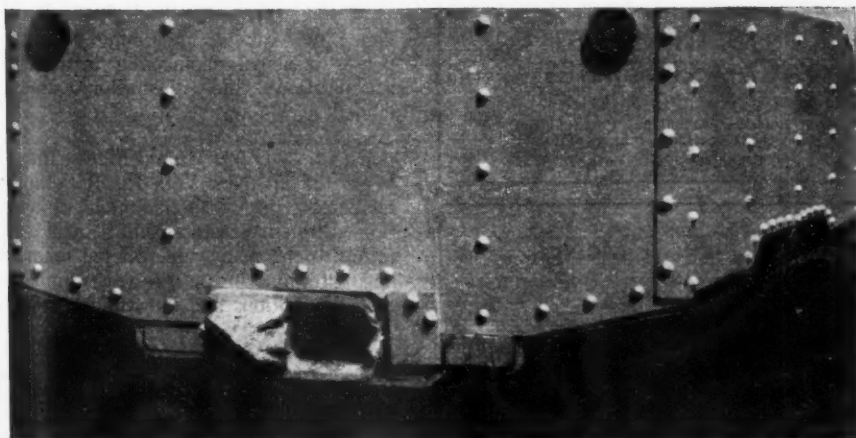
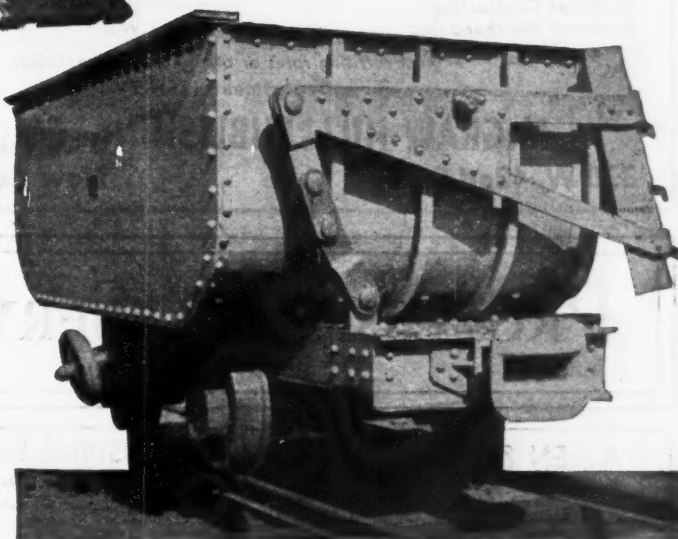
Built for a long life of rugged duty—

***time saving
labor saving
low
maintenance***



INDUSTRIAL CARS

Strong all-welded, all-steel construction combine body and frame. Outswinging side doors are held by sturdy semi-steel hinges. Heavy spring-type link and pin couplers. Equipped with Oilspok wheels with Timken roller bearings in hub. One lubrication, and no attention or adjustment required over several years.



MINE CARS

These mine cars have long been favored for durability and low upkeep. Sturdy riveted and welded steel construction, automatic couplers. Solid ends for rotary dumping, and wheel brakes with wood blocks, rear operated. Body belts inside of vertical sides provide maximum capacity.

Write for further details on mine, ore or industrial cars.

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These cars are developed for work in narrow long tunnels and are equipped with special dump wheel mechanism. Strong, reinforced construction for handling heavy ore—partly welded, partly riveted body of heavy steel plate with extra strengthened bottom. Hinges and door mechanism oversized for heavy duty. Oilspok running gear with Timken roller bearings in hubs. Good for several years operation on one lubrication.

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new three-bag size concrete mixers, the Kwik-Mix 16-S Dandie, illustrating every important construction feature, including the tilted flow-line discharge chute and the selective skip shaker.

WIRE STRIPPERS—Ideal Commutator Dresser Co., 1291 Park Ave., Sycamore, Ill. Bulletin Form WSB-1144 describes a new electric "hot blade" wire stripper, which is said to burn off insulation quickly and cleanly, without frayed ends or cut wires.

EARTH-MOVING AND CONSTRUCTION EQUIPMENT—R. G. LeTourneau, Inc., Peoria, Ill. Catalog Form G-1066 describes and pictures the entire LeTourneau equipment line and distributor shop and service facilities. Full-page illustrations from showroom-type photos are augmented by on-the-job action pictures of equipment in various applications. Operational features of each tool are fully described, specifications given and improvements over older models analyzed in detail.

CRUSHERS—American Pulverizer Co., 1119 Macklind Ave., St. Louis 10, Mo. Bulletin presents special features of American rolling ring and hammermill crushers, grinders and shredders, describing crushers for metal turnings, coal, stone and a wide variety of friable, semi-abrasive and fibrous materials. The crusher size, horsepower, speed, weight and floor space required for producing a uniform product at specified capacities is charted for coal, limestone and metal turnings. The chart shows specifications for bituminous coal as well as production for domestic stoker sizes or commercial screenings. All crushers are illustrated and a cross-section view shows construction and operating features of the rolling ring crusher.

ENGINEERING INSTRUMENTS—W. & L. E. Gurley, Troy, N. Y. Bulletin 50 is a condensed catalog describing the company's principal engineering instruments. Specifications and illustrations are included.

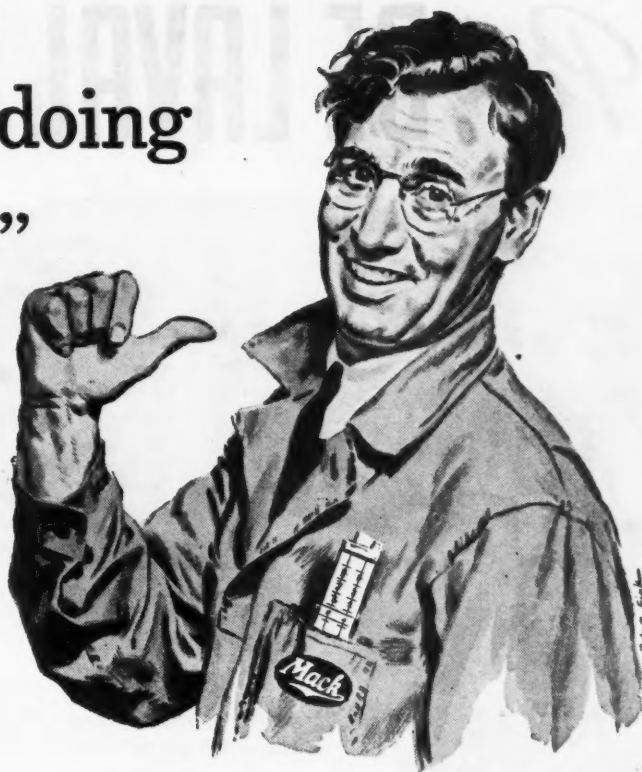
FILTERS—Oliver United Filters, Inc., 33 West 42d St., New York 18. Bulletin 214 tabulates types of filters, mode of operation, distinctive features and general application of the many units offered for handling filtration and clarification problems, with descriptions and illustrations.

MAGNETIC MINE STARTERS—Clark Controller Co., Cleveland, and Ensign Electric & Mfg. Co., Huntington, W. Va. Bulletin 5390 describes 230- and 500-volt d.c. heavy-duty automatic non-reversing and reversing starters with definite time acceleration for coal-mine conveyors, gathering pumps and similar applications. Included are salient features, application and equipment list.

MOTOR-GENERATOR MAINTENANCE AND REPAIR EQUIPMENT—Ideal Commutator Dresser Co., Sycamore, Ill. Bulletin MMH-645 gives hints on care, detailing troubles and remedies, besides describing a wide variety of equipment for reconditioning war-weary machinery.

"Me...an Engineer...doing this and liking it!"

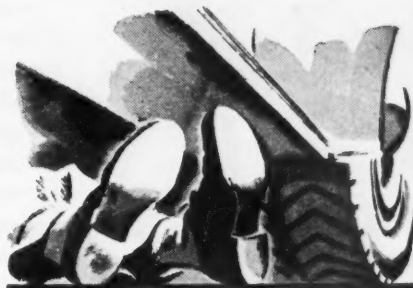
"Ever hear of a design engineer *repairing* the trucks he designs? It happens regularly at Mack—and we wouldn't have it otherwise! Believe me, mister, every time a Mack engineer gets his hands dirty, he's saving your money and your mechanic's time. It's like this..."



1. When a designer gets away from his drawing board and under the hood, he really begins to appreciate the maintenance man's angle. He sees mighty quickly...



2... why a truck should be designed so that a repair man can reach the parts he wants without spending half a day just getting to them...



3... and he begins to sense that groping for a part under the hood or chassis is a lot different from pointing to it on a blueprint. Well, sir, after a couple of lessons like that...



4... you've got a mighty practical design engineer! We Mack engineers have been through the mill. That's why we're so conscious of the importance of *accessibility* as a maintenance factor.



5. Mack design makes your mechanic's job easier—saves his time and your money—shortens layoffs for repairs. Just one more reason why Mack Trucks *cost less in the end*. Look around—look ahead—buy Mack!



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ONE TON TO FORTY-FIVE TONS

New Mack Trucks are available for essential civilian use. Ask for details.

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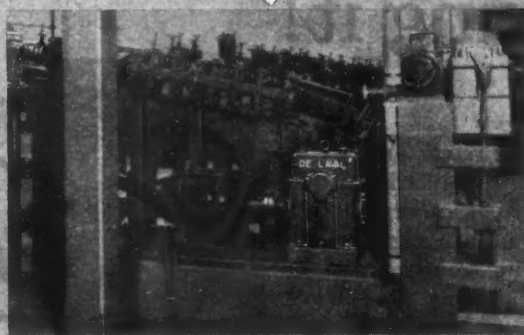


Mack Trucks, Inc., Empire State Building, New York City. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts.

Pick **DE LAVAL** WORM GEARS *for All Drives*



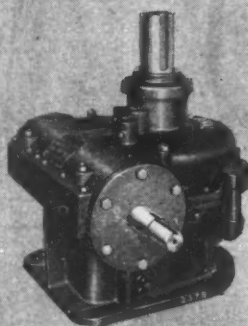
Roller conveyors



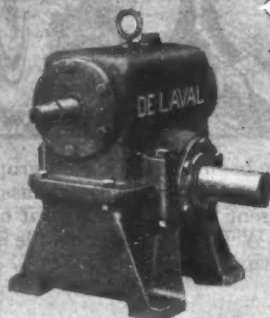
Machine in paper mill using three De Laval worm gears



Raw-grinding department of cement mill



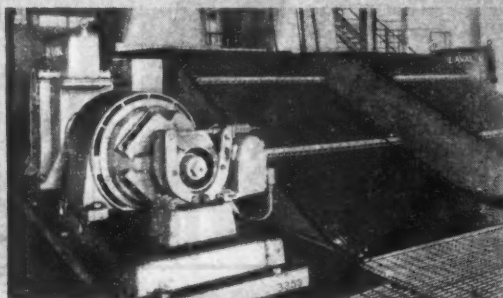
Vertical shaft



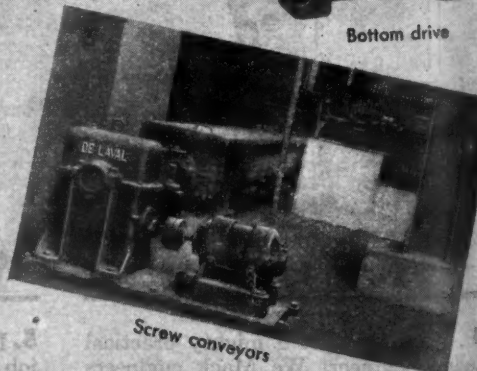
Top drive



Paper machine



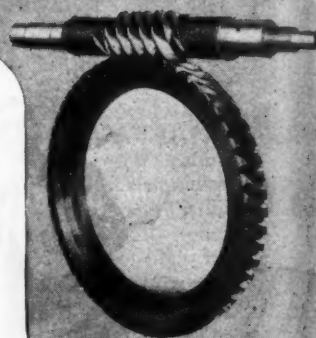
Apron conveyer



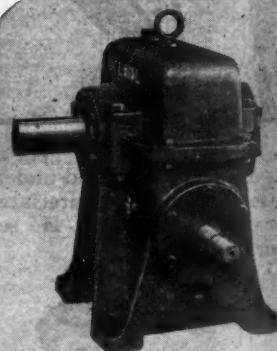
Screw conveyors

- where space is limited and a close-coupled or short-center drive will permit closer or better placement of machinery;
- where an invariable speed ratio is needed;
- where a high speed reduction is involved;
- where smooth, uniform transmission of torque and speed are better for motor or driven machine;
- where dust, grit and moisture will be encountered;
- where changes in temperature and humidity may occur;
- where spattering of oil or grease is to be avoided;
- where obstruction of light and stirring up of dust are objectionable;
- where freedom from vibration and noise is wanted;
- where personal hazard is to be eliminated;
- where inspection and attendance will be infrequent;
- where non-stop, 24-hour operation is planned.

De Laval worms and worm-wheels or rims can be incorporated in your own designs, or units complete with bearings and housings will be supplied. State requirements in detail and ask for Publication W-1138.



Worm and rim



Bottom drive

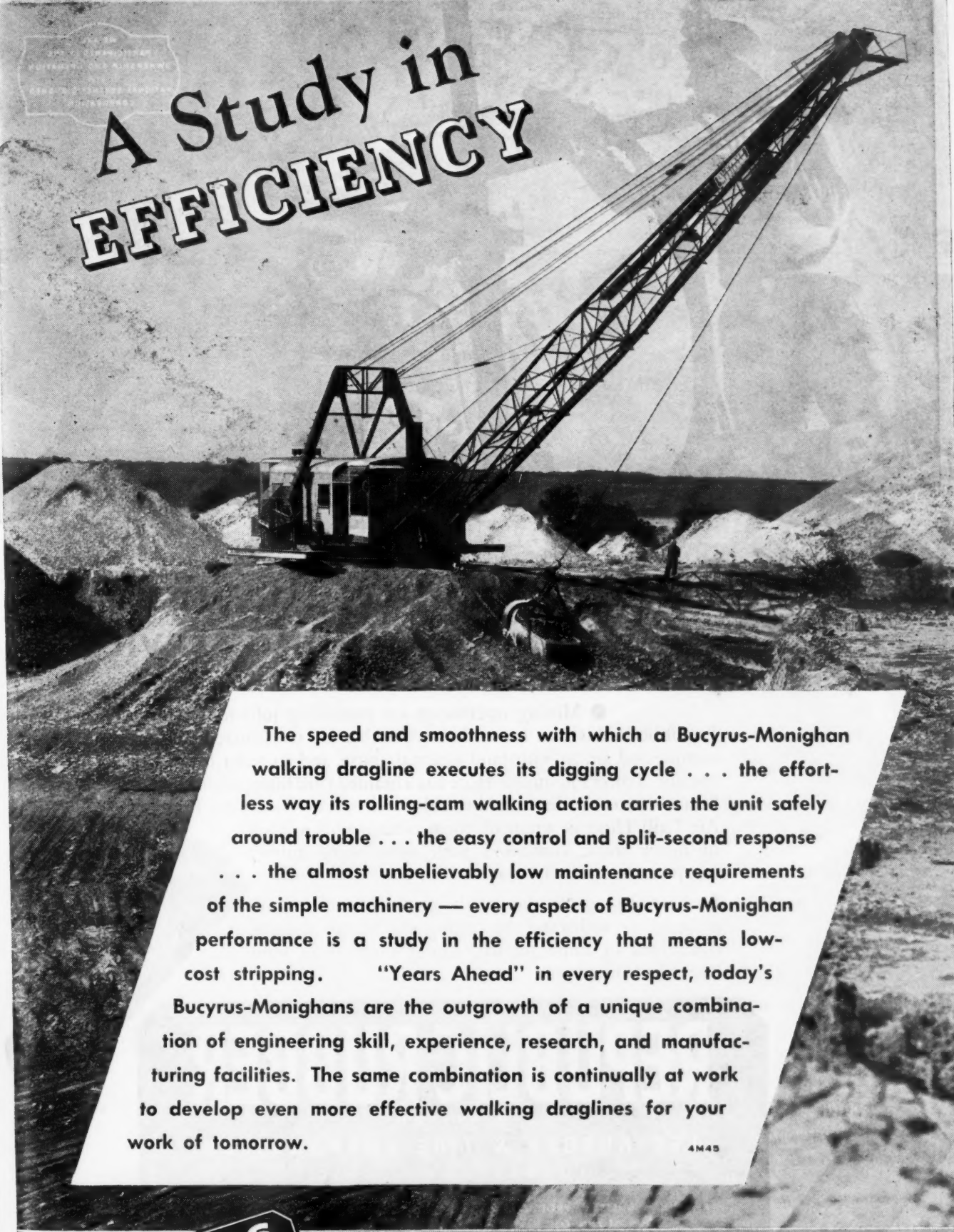
DE LAVAL

WORM GEAR DIVISION

of the De Laval Steam Turbine Co., Trenton, N. J.

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4M45

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by Republic*

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IN MINING SERVICE**

● Mining operations are punishing jobs for air hose. Republic builds two heavy-duty types that are constructed to carry compressed air, to withstand external abuse, and to resist hot oil in the line. Tower Pneumatic Hose has a braided cord body, with oil-and-heat-resistant synthetic rubber tube and cover. Champion Reprene Air Drill Hose is wrapped construction with a body of heavy duck, combined with oil-resisting rubber compounds, specially designed for rock drill work.

Both are noted for the tough, resilient covers, compounded to withstand the cutting and severe abrasive conditions in mine service. Order them from your Republic Distributor.



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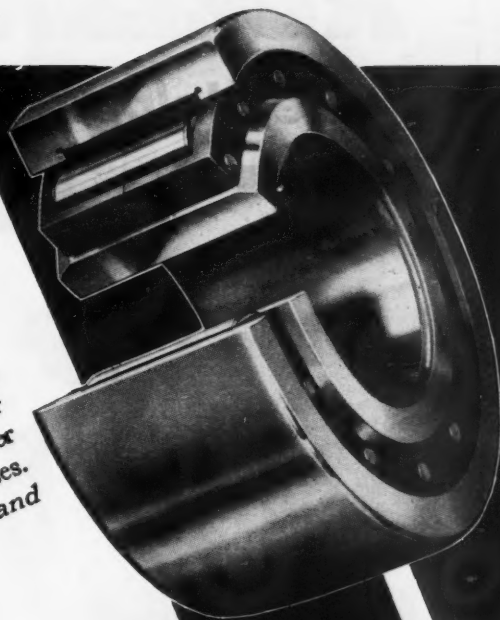
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● In many applications—particularly in heavy-duty service—Rollway Solid Cylindrical Roller Bearings outlast and outperform other types of bearings. There's more metal to carry the load . . . long line contact with the race . . . and lower unit pressures. A combination that affords from 3 to 5 times the carrying capacity of equal-sized ball bearings. But that's only half of the story. Rollway Right-Angle Loading splits compound loads into the two simple components of *pure radial* and *pure thrust*—each of which is carried on a separate set of rollers. Total load magnitudes per bearing are lower, and are carried perpendicular to the roller axis. There are no oblique resultants, no complicated stresses. Stress analysis and bearing computations are simpler and more exact.

ROLLWAY BEARING CO., INC.
Syracuse, N. Y.



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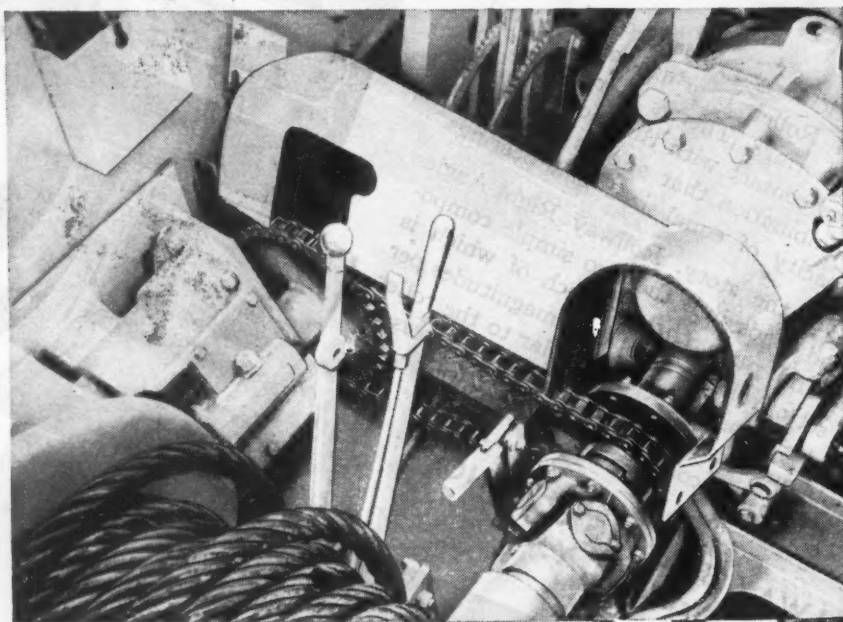
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COAL AGE • September, 1945

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Are Helping to Finish the Job



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Whitney Roller Chains, still pulling for victory on every remaining battle front, are assuming their well-earned position in post-war planning. Built with *precision* parts, accurately joined, Whitney Roller Chains in-

sure powerful, positive drive — delivery of full rated machine capacity. For uninterrupted top performance, plan to equip *all* your production machines with Whitney Roller Chain drives. Write for catalog.

The WHITNEY CHAIN & MFG. CO., Hartford 2, Connecticut

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INDIVIDUAL EYECUPS
Anatomically designed ...
Rounded edges for Comfort ...
Low-set for wide vision ...
Cool, well ventilated ...

AO Duralite Goggles—sturdy yet lightweight—are equipped with impact resisting AO Super Armorplate Lenses that provide maximum possible protection from chips that come from *any direction*.

The individual eyecups are anatomically designed and have rounded edges for comfort. They are also especially well ventilated to reduce any possibility of fogging.

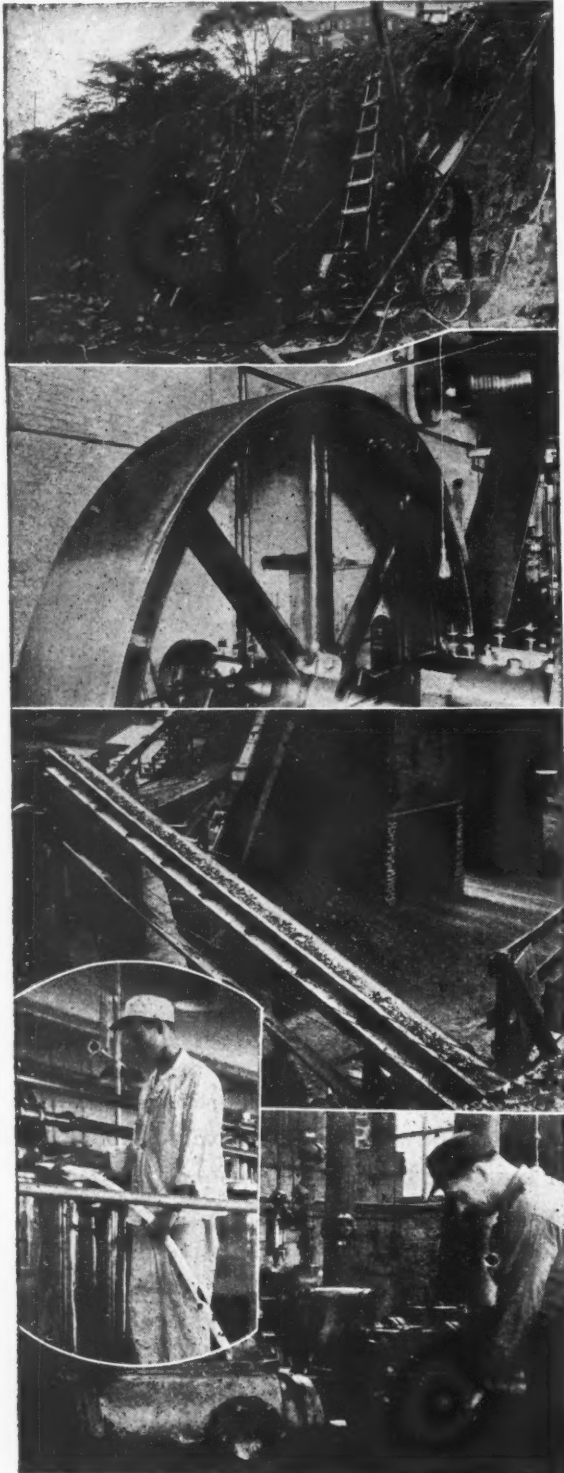
AO Duralite Goggles have a one-piece adjustable headband that allows a secure yet comfortable fit, will not catch the hair, and is resistant to perspiration, oil, water and grease.

Write your nearest MSA representative for complete details.

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SOUTHBRIDGE, MASSACHUSETTS

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*When desired
quantities of
INDUSTRIAL RUBBER GOODS
will be available*



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It is good policy to keep on asking for Quaker—the name that stands for Quality Industrial Rubber Products.



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WAR BONDS**

*"If there is a way to get it done
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FORMER ENGINE 20 gallons of gasoline a day
 SHEPPARD DIESEL 5 gallons of fuel oil* a day

*(at half the cost per gallon of gasoline)

IN FEBRUARY, 1945, the Jones Scott Company of Walla Walla, Washington, selected a new engine for their Bucyrus-Erie Shovel. Because they wanted to lower fuel costs, they specified a Sheppard Diesel.

Records prove that Jones Scott couldn't have made a better choice. The Sheppard Diesel uses about five gallons of oil per day. The former engine consumed about twenty gallons of gasoline. Diesel fuel costs

only half as much as gasoline. Enormous is not an exaggerated term to use for the savings in fuel costs when it is considered that this Sheppard Diesel operates eight hours per day, six days per week.

The engine must be able to handle shock loads and quick load changes in addition to delivery of peak power for long periods of time. In the words of Jones Scott, they chose a Sheppard Diesel because of "economy,

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POWER UNITS; 8 TO 56 HP • GENERATING SETS; 3 TO 36 KW

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The Bituminous Mine Safety Engineers are well-known throughout the industry for their ability to make practical, common sense suggestions which prevent accidents.

When you protect with Bituminous Workmen's Compensation you know it is complete protection plus the valuable services of the Bituminous Mine Safety Engineers.

**BITUMINOUS CASUALTY
CORPORATION**

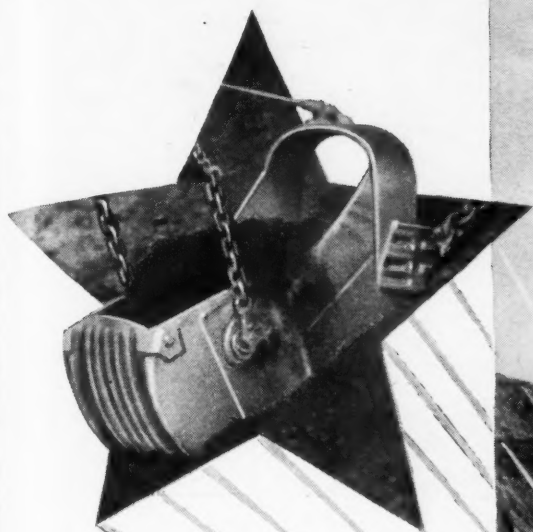
ROCK ISLAND ILLINOIS



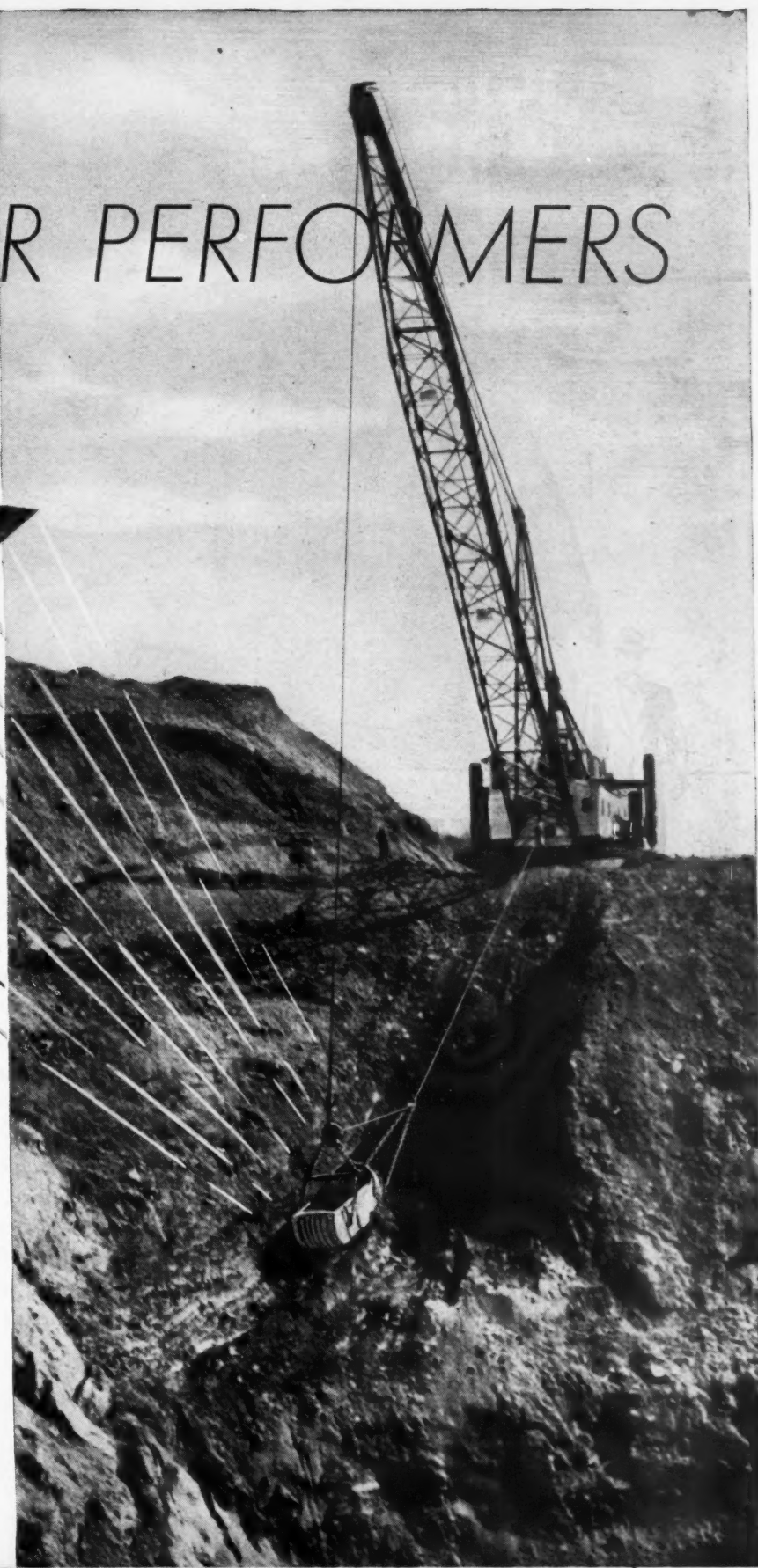
OVER 28 YEARS SERVICE TO THE INDUSTRY

PAGE

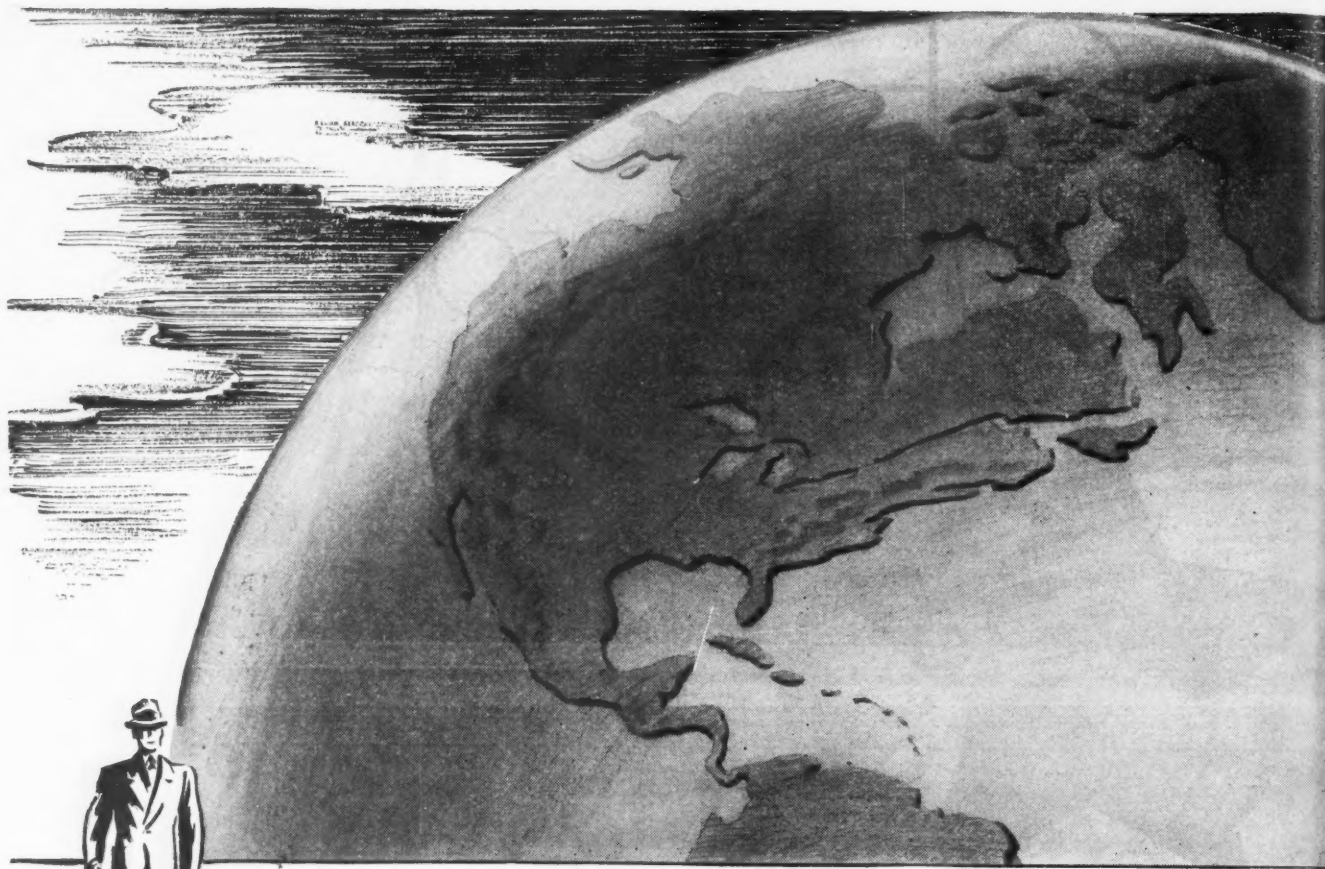
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PAGE ENGINEERING COMPANY, CHICAGO 38, ILLINOIS



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The Dorr Company maintains a staff of thoroughly trained engineers at strategic points throughout *half a hemisphere* to render immediate service wherever and whenever needed... service in all fields to all Dorr instal-

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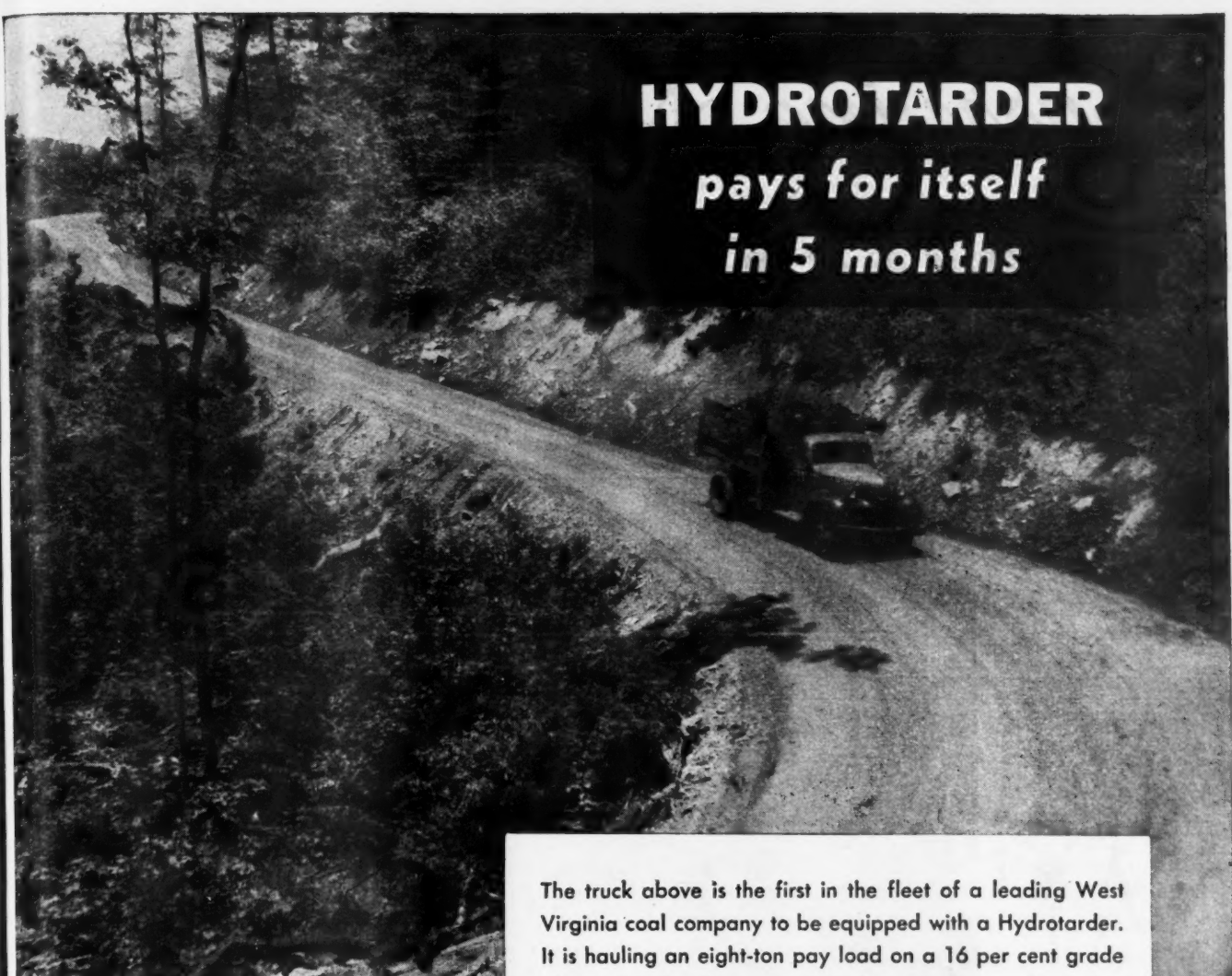
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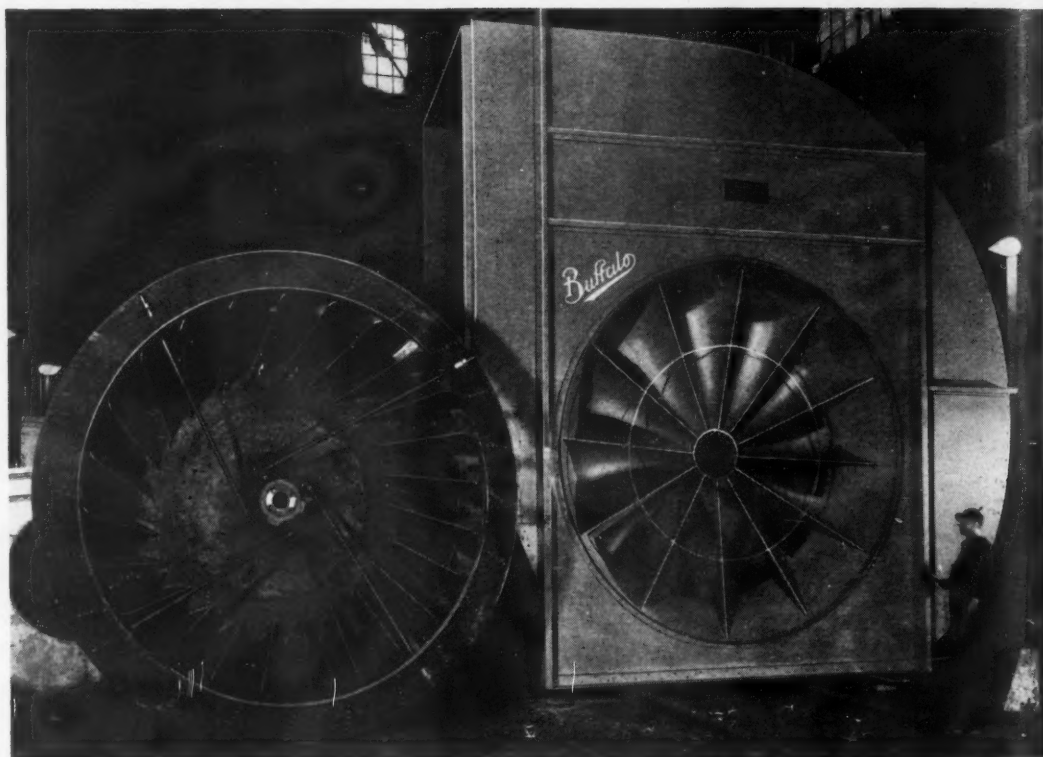
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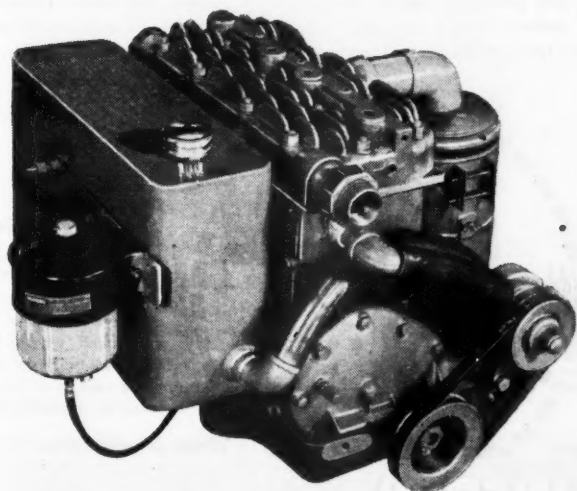
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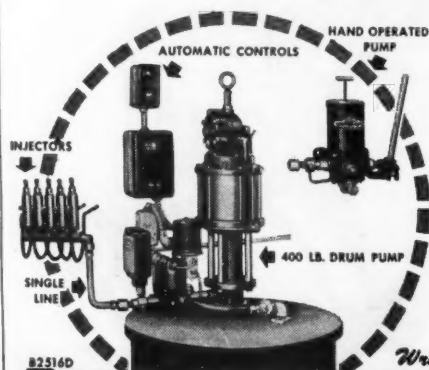
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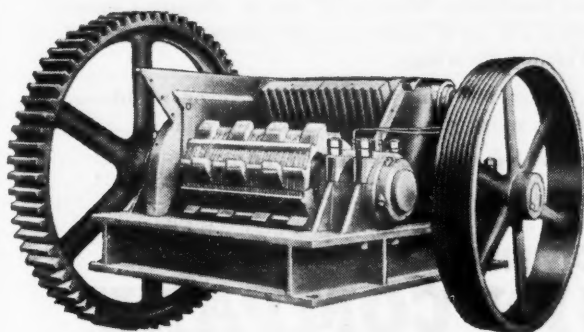
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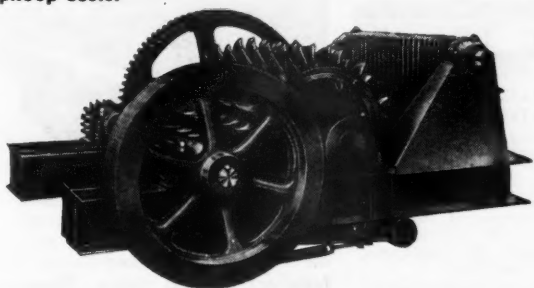
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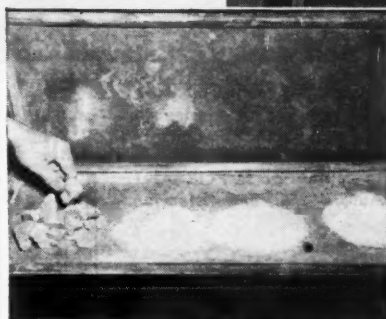
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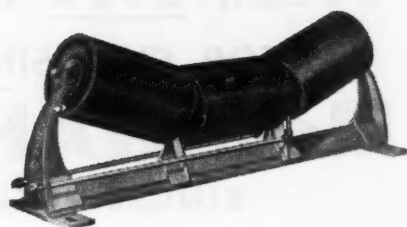


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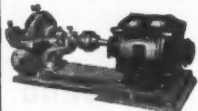


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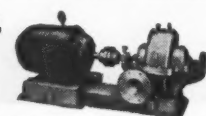
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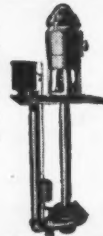
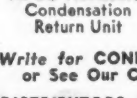
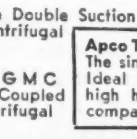
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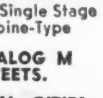
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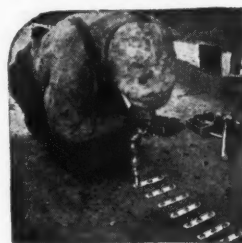
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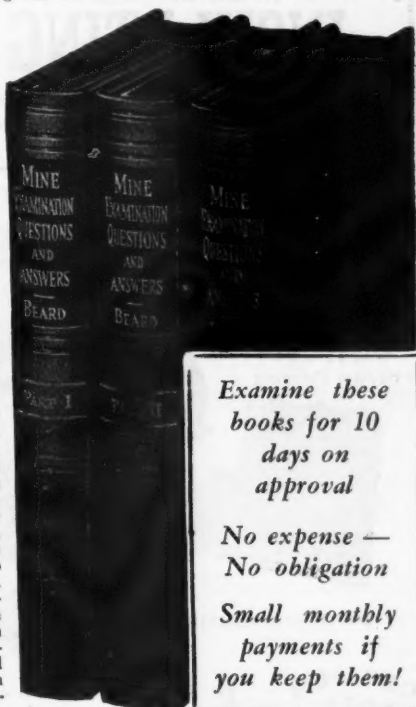
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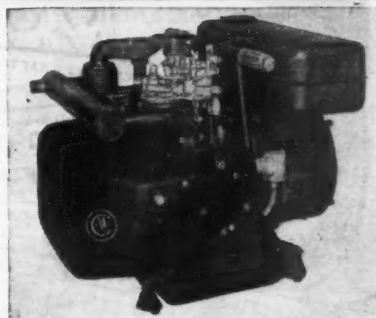
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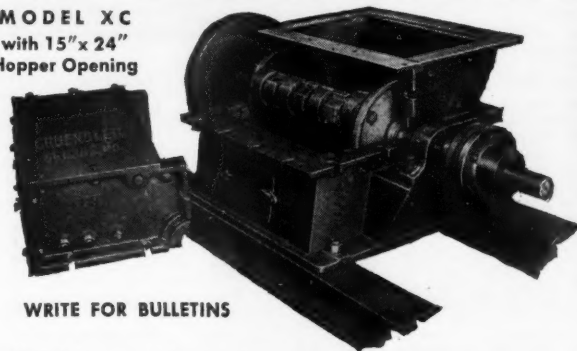
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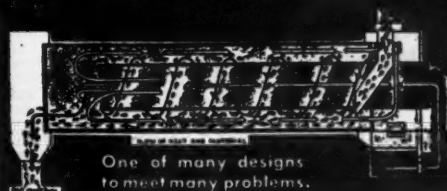
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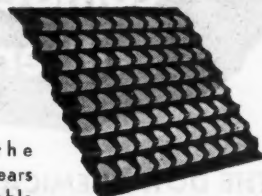
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Since Hendrick developed the Flanged Lip Screen over 10 years ago, it has proved the best available for screening and dewatering bituminous and anthracite coal. Tapered openings guard against clogging—speed screening! Flange at the end of each clot agitates material, shakes off slack, and provides more efficient separation. Write for full data.

HENDRICK MANUFACTURING CO.

64 DUNDAFF ST.

CARBONDALE, PA.

Sales Offices in Principal Cities

MAN-power "MP"

It takes Man-Power to make modern organization and equipment effective. The Man-Power of the industry served by COAL AGE is the experienced personnel included among the 12,000 subscribers of this paper. If your organization needs MAN-power, you can locate the best man, or men, available through a Position Vacant Advertisement in the SEARCHLIGHT SECTION of COAL AGE.

SEARCHLIGHT SECTION

(Continued on pages 213-219)

POSITIONS VACANT

WANTED: EXPERIENCED, capable, reliable engineer, for a growing, reliable stripping coal corporation. Permanent position. Give experience, reference and salary expected. Write P-318, Coal Age, 520 N. Michigan Ave., Chicago 11, Ill.

WANTED

Superintendent or Mining Engineer

For large strip mine in North Dakota. Good chance for personal advancement. Write fully and state salary desired.

DAKOTA COLLIERIES COMPANY
1506 Foshay Tower
Minneapolis, Minnesota

POSITIONS VACANT

WANTED: MASTER mechanic for reliable growing coal stripping corporation. Must know large stripping equipment. Give full details as to experience, reference and salary expected. Write P-319, Coal Age, 520 N. Michigan Ave., Chicago 11, Ill.

IMPORTANT MINING engineering organization invites inquiries from experienced coal mining engineers and superintendents familiar with inclined seam mining, also mechanical engineers familiar design of screening and washing plants and general design mining plants. Also from stripping engineers and stripping superintendents-master mechanics familiar upkeep stripping and general mining equipment, and electrical maintenance engineers. Applicants must be willing to sign three year contracts for work under good conditions in foreign countries. Give full details education, experience and salary expected. P-323, Coal Age, 320 W. 42nd St., New York 18, N. Y.

POSITIONS WANTED

POSITION AS Mining engineer or draftsman. Thirty years experience. Registered in State of West Virginia. Good references can be furnished. PW-324, Coal Age, 330 W. 42nd St., New York 18, N. Y.

YOUNG BELGIAN mining engineer, 32 years old, eight years practice in coal mining, desires early engagement in an American mine of any kind. Address J. Delhaye, 51 Avenue Reine Astrid, Hasselt, Belgium.

BUSINESS OPPORTUNITY

COMPANY WITH loaders and other mining equipment for high coal please contact inactive mine owner for attractive proposition to operate property. Describe equipment. BO-320, Coal Age, 520 N. Michigan Ave., Chicago 11, Ill.



REPRESENTATIVES WANTED

Prominent eastern manufacturer of carbon brushes has several vacancies for alert, aggressive sales representatives, covering the mine districts. Should have some knowledge of commutation. Unusual opportunity.

ELECTRO-NITE CARBON CO.

1133 East Columbia Ave., Philadelphia 25, Pa.

16,500 acres land with estimate of 300,000,000 tons of coal, \$7.50 per acre. Also coal land suitable for strip mining. Complete details upon request.

G. B. LORRAINE

Law Bldg. Richmond 19, Va.

FOR SALE

2 ANTHRACITE COAL BANKS
Containing #4 and #5 silt, approximate tonnage 350,000 tons and 100,000 tons in Schuylkill Region.

WALTER SIDORIAK, Attorney

503 Thompson Building, Pottsville, Penna.

WANTED

Considering purchase of 10 yard late type dragline, either electric or diesel but diesel preferred. State location, condition, make, size, age, price, and terms in first letter.

W-322, Coal Age

520 North Michigan Ave., Chicago 11, Ill.

Coal Cutting Machines

11—CE-7 Sullivan Shortwall AC Coal Cutters, 30 H.P. Motors, 7½' Cutter Bars, Tip-Turn Trucks and approx. \$5000. worth of new parts. We can make attractive prices on these machines. All in guaranteed condition.

Write for Stock List

FLORENCE MACHINERY & SUPPLY CO.

904 Equitable Building, Denver 2, Colo.
Yards and Warehouses at Denver and Florence

FOR SALE—

SHASTA DAM SAND AND GRAVEL PLANT EQUIPMENT

Including—
GOODYEAR 9-MILE-HAUL 36" SPECIAL CONVEYOR BELTING
32,000' of Belt Remaining With Idlers, Pulleys, and Drives

ALSO—

Electric Motors, Line Equipment, Transformers, and Supplies
Pendulum Boom Belt Conveyors, 100' and 200'

Merrick Feedweights and Weightometers
Dorr Hydroseparator, 20' x 4'

Marcy Rod Mill, 8' x 12'

Vibrating Screens

Dorr Rake and Bowl Classifiers

Extra-heavy Gravel Washer, Trommel type

Pumps: Centrifugal, Deep-well, Steam,

Dredge

Auxiliary Equipment: Chain Hoists,

Winches, Welding Machines, etc.

Subject to Prior Sale

Write, Wire, Telephone Redding 1440

Columbia Construction Company, Inc.

Box 579

Redding, California

READY FOR IMMEDIATE SHIPMENT

4—10-ton Jeffrey Locomotives—

(13-ton equipment)

Serial numbers—5203—5758—

6220—6221

Motors—2 MH-110, 250 volt

B.B.

Axle diameter 4½"

Inside steel tired wheels... 33"

Wheel base 60"

Height 38"

Outside armorplate frame

MB-26E Arcmaster Control

(Equipped with gear cases and steel strip resistances)

While these locomotives are now

44" gauge they can be easily

changed to 36" or 42" gauge merely

by shoving the wheels in on the

axles. They have just been taken

out of service and are equal to re-

built locomotives.

1—15-ton Goodman Locomotive—

Serial number 4604

Motors—36-A-0-4-C, 250 volt

B.B., 90 H.P. each

Outside armorplate frame... 3½"

Height 38"

We also have several 6 and 8-ton General

Electric Locomotives with HM-801, 803, 821

and 823, 250 volt ball bearing motors, all

equipped with CY-21 gathering reels and

steel strip resistances. 36" to 44" track

gauge. Can be easily changed to any

gauge suitable for your requirements.

2—200 KW General Electric Motor Genera-

tor Sets, 250/275 volt DC, 1200 RPM, 3

phase, 60 cycle, 2300/4000 volt AC.

(Equipped with CY-21 floating

type gathering reels and cable)

The armatures are equipped with

Mica Glass Insulated Coils—have

steel strip resistances and gear

cases. Completely rebuilt and

guaranteed.

Wheel base 66"

Controller type L.M-61

Inside steel tired wheels... 33"

Track gauge now 44"—can be

easily changed to 36" or 42"

(This locomotive completely rebuilt

and guaranteed.)

8—8-ton General Electric Locomo-

tives—

Serial numbers—8406—8407—

7534—8465—9844—10381—

10382—10383

Motors—HM-822, 250 volt B.B.

Controller type R-109

Height overall 31"

Draw bar pull 4000±

Wheel base 46"

Outside armorplate frame... 2½"

Steel tired wheels..... 30"

(Equipped with CY-21 floating

type gathering reels and cable)

The armatures are equipped with

Mica Glass Insulated Coils—have

steel strip resistances and gear

cases. Completely rebuilt and

guaranteed.

complete with switchboards and all necessary switchgear, including automatic reclosing circuit breaker for the DC end.

2—Very late type Jeffrey L-400 Loading Machines—purchased new in 1942. Excellent operating condition.

Several 3, 4 and 5-track Steel Tipples and Electric Hoists with 200 to 1500 H.P. motors.

We specialize in buying complete mines that are going out of business or from receivers in bankruptcy, administrators of estates, etc.

COAL MINE EQUIPMENT SALES COMPANY

306-7 Beasley Building

L. D. Phone-34

Terre Haute, Indiana



Frank J. Wolfe

NEW DIESEL-GENERATOR WE OWN AND CAN SHIP IMMEDIATELY

1—New Caterpillar D13000 diesel engine with electric starting equipment, direct connected to new 75 KW generator with new 20 KW top mounted, belted generator, complete with instruments, batteries, spare parts, etc. No priority or release required.

L. B. SMITH, INC.

Camp Hill, Pa.

Harrisburg 7331

SPECIAL OFFERING 85

50-TON ALL STEEL SIDE DIS-
CHARGE HOPPER CARS.
1831 cu. ft. CAPACITY. CAST
STEEL SIDE FRAMES.

PROMPT DELIVERY

IRON & STEEL PRODUCTS, INC.

40 years' experience

13484 S. Brainard Ave., Chicago 33, Ill.

"ANYTHING containing IRON or STEEL"

ISP'S popular Scripto Pencil sent to all responders.

**UNIVERSAL TOOLS! NATIONALLY
ADVERTISED BRANDS AND PRICES.**

If it's Tools—We have it, Can get it, or it
isn't made! Price List & Order Blank Free!

UNIVERSAL TOOL COMPANY

O. B. Demattels, President

1527 Grand P. Kansas City, Missouri

Immediate Shipment: Overnight by Air: To

Anywhere—USA.

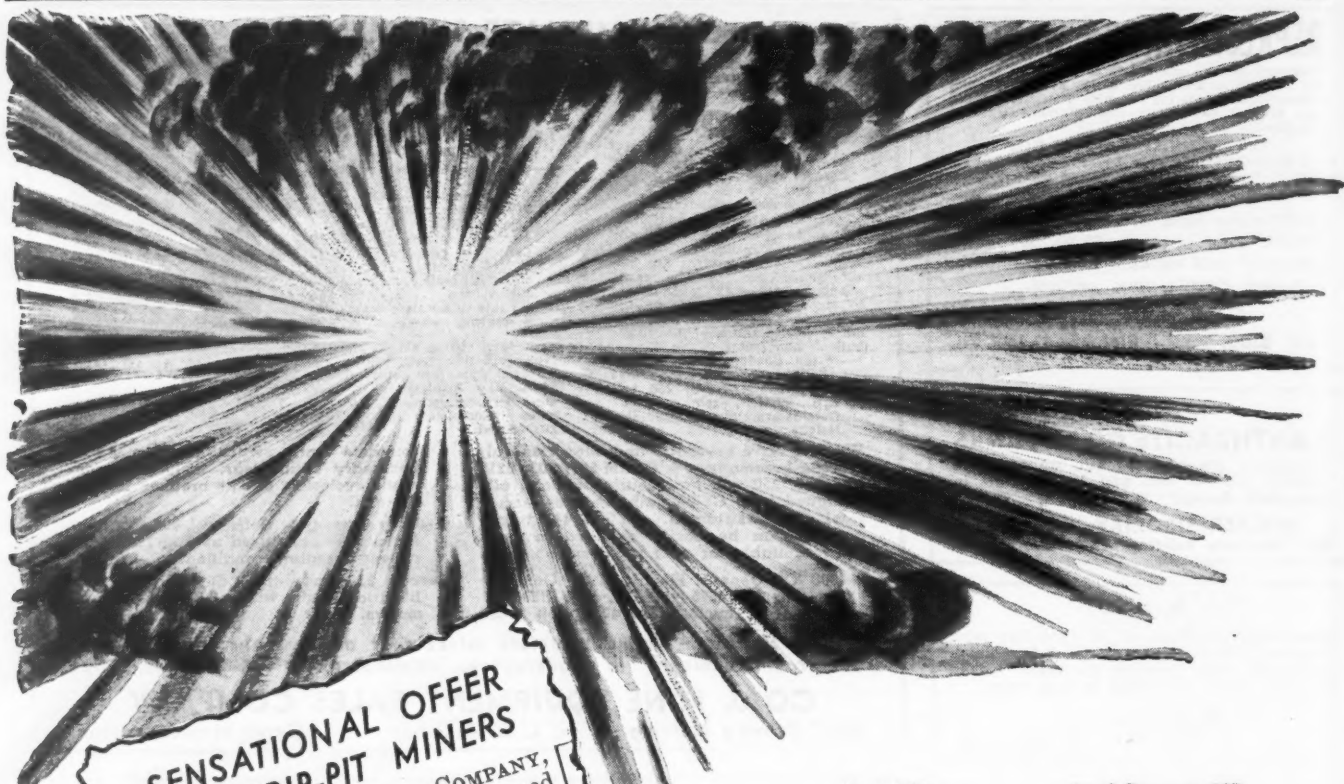
BONDED SCALES, VIBRATING SCREENS, CRUSHERS

15 ton, 22' x 9' Truck Scale . . .	\$ 440.00
20 ton, 24' x 10' Truck Scale . . .	\$ 575.00
20 ton, 34' x 10' Truck Scale . . .	\$ 815.00
26 ton, 24' x 10' Truck Scale . . .	\$ 842.00
33 ton, 34' x 10' Truck Scale . . .	\$1040.00
40 ton, 40' x 10' Truck Scale . . .	\$1565.00
3 ton Tipple Scale	\$ 135.00
3' x 6' Single Deck Screen . . .	\$ 495.00
3' x 8' Double Deck Screen . . .	\$ 685.00
3' x 8' Single Deck Screen . . .	\$ 585.00
3' x 8' Three Deck Screen . . .	\$ 885.00
Double-Roll Coal Crusher . . .	\$ 345.00
Large Double Roll Crusher . . .	\$ 795.00
Portable Power Bag & Stacker . .	\$ 600.00

We manufacture over 100 models of scales, vibrating screens, crushers, conveyor stackers. More than 1500 mines have our equipment. Immediate delivery. Write, phone or wire for catalog and prices.

BONDED SCALE COMPANY, MFRS.

2190 S. Third St., Columbus 7, Ohio



SENSATIONAL OFFER TO STRIP-PIT MINERS

Today the ECONOMY COMPANY, prominent distributor of used Power Shovel, Dragline and Hauling Equipment, offers to Strip-Pit Miners a large list of stripping equipment, on a "Pay-as-you-Go" basis, with the privilege of ownership.

Among leaders in the Coal-Strip-ping Industry, the plan is regarded as giving an added impetus to early letting of new contracts. Here is what one prominent strip-ping contractor says about the plan:

3/8 YARD

3/8 yd Bucyrus 10B
3/8 yd Bay City 20
3/8 yd Bay City Pup
3/8 yd Byers Bearcat
3/8 yd Hanson
3/8 yd Insley
3/8 yd Buckeye
3/8 yd Lorain 27
3/8 yd Universal
3/8 yd Unit

1/2 YARD

1/2 yd Bay City Model K
1/2 yd Bay City 30

1/2 yd Bucyrus 10/20
1/2 yd Byers Bearcat
1/2 yd Byers 128
1/2 yd General
1/2 yd Hanson
1/2 yd Insley
1/2 yd Speeder B3
3/8 yd Link-Belt Speeder
1/2 yd Lorain 30
3/8 yd Mead-Morrison
1/2 yd Northwest 2
1/2 yd P&H 200
1/2 yd P&H 150
3/8 yd P&H 300A
3/8 yd Unit
1/2 yd Universal

3/4 YARD

3/4 yd American
3/4 yd Austin
3/4 yd Bay City 16B
3/4 yd Brownhoist
3/4 yd Bucyrus 20B
3/4 yd Bucyrus diesel D2
3/4 yd Bucyrus 10/30
3/4 yd Bucyrus GA
3/4 yd Bucyrus 30B
3/4 yd Byers
3/8 yd Byers Bulldog
3/4 yd General
3/4 yd Keystone
3/4 yd Koehring 301
3/4 yd Koehring 251
3/4 yd Link-Belt
3/4 yd Speed crane
3/4 yd Lorain 40
3/4 yd Lorain 45
3/4 yd Marion Model 7
3/4 yd Marion Model 120
3/4 yd Mead-Morrison
3/4 yd Northwest Model 3
3/4 yd Northwest 105
3/4 yd Northwest 102
3/4 yd Osgood
3/4 yd P&H 400
3/4 yd P&H 206

1 YARD

1 yd Austin
1 yd Browning K2

1 yd Bucyrus 30B
1 yd Bucyrus GA2
1 yd Bucyrus diesel 30B
1 yd Bucyrus-Erie GA2
1 yd Byers Model Master
1 yd Keystone
1 yd Koehring 401
1 yd Speedcrane
1 yd Link-Belt K1
1 yd Link-Belt K-32
1 yd Lorain 55
1 yd Lorain 60A
1 yd Marion 440
1 yd Marion 7
1 yd Northwest
1 yd Northwest 4
1 yd Northwest 105
1 yd Osgood
1 yd P&H 600

1-1/4 YARD

1 1/4 yd Bucyrus GA2
1 1/4 yd Bucyrus GA3
1 1/4 yd Byers Master
1 1/4 yd Koehring Model 1
1 1/4 yd Lima 101
1 1/4 yd Link-Belt K42
1 1/4 yd Lorain Model 75
1 1/4 yd Lorain 75A

ECONOMY COMPANY INC

NEW YORK

ECONOMY CO. *says:*

Bid that Strip Job NOW—

"Pay-as-you-go" for EQUIPMENT

That news clipping on the opposite page tells the story in a form as compact as the atomic bomb itself—and it has the same startling news-interest.

Now—you can go ahead and bid any stripping job—any size—and be sure of getting equipment to cover it—at once. You pay as you go and apply payments against the purchase price later, if you wish.

You can't lose—and you stand to win in a big way by landing a good, heavy stripping job, with good tonnage in sight—right NOW—when coal is needed.

1 1/4 yd Marion 450
1 1/4 yd Marion diesel 450
1 1/4 yd Northwest 5
1 1/4 yd Northwest 104
1 1/4 yd Osgood
1 1/4 yd P&H 600A
1 1/4 yd P&H 700
1 1/4 yd P&H 650

1-1/2 YARD

1 1/2 yd Bucyrus-Erie 37B
1 1/2 yd Koehring diesel
1 1/2 yd Koehring 601
1 1/2 yd Lima
1 1/2 yd Link-Belt K2
1 1/2 yd Lorain 75B
1 1/2 yd Lorain 77 diesel
1 1/2 yd Marion
1 1/2 yd Northwest 6
1 1/2 yd Osgood diesel
1 1/2 yd P&H 750
1 1/2 yd P&H 700B

1-3/4 YARD AND LARGER

1 3/4 yd Bucyrus-Erie 2 diesel
1 3/4 yd Koehring 702
1 3/4 yd Northwest
1 3/4 yd diesel Page
1 3/4 yd P&H 775

2 yd Bucyrus 50B
2 yd Bucyrus-Monighan
2 yd Page diesel
2 yd P&H 705
2 1/4 yd P&H 780 diesel
2 1/2 yd Bucyrus-Monighan
2 1/2 yd Link-Belt K-55
2 1/2 yd Northwest Model 80
2 1/2 yd Sargent
3 yd Link-Belt K-55
3 yd Bucyrus-Monighan
3 yd Bucyrus-Monighan 3W
3 yd Marion 40A
5 1/2 yd Bucyrus diesel

ELECTRIC

3/4 yd Thew Shovel
3/4 yd Bucyrus 20B
1 yd Northwest 105
1 1/4 yd Marion 37
1 1/4 yd Marion 32
1 1/4 yd Bucyrus 42B
1 1/4 yd Marion 37
2 yd Bucyrus 50B
2 yd Marion 37
3 yd Marion 125
4 yd Marion 125
3 yd Monighan
4 yd Marion 4160
7 1/2 yd Marion 7200

15 yd Bucyrus
26 yd Marion

STEAM

3/4 yd Bucyrus B2
3/4 yd McMyler
3/4 yd Osgood
1 yd Browning
1 1/4 yd Bucyrus 30B
1 1/4 yd Osgood
1 yd Byers
1 1/4 yd Marion
1 1/4 yd Marion 36
1 1/4 yd Bucyrus 30B
1 1/2 yd Austin
1 1/2 yd Bucyrus 50B
1 1/2 yd Marion 32
1 1/2 yd Marion 37

1 1/2 yd Osgood
1 1/4 yd Marion 37
2 yd Bucyrus 50B
2 yd Bucyrus 14
2 1/2 yd Bucyrus 80B
2 yd Marion 36
2 yd Monighan
2 yd Osgood
2 1/2 yd Osgood 70C
3 yd Marion
3 1/2 yd Bucyrus-Erie 175B
3 1/2 yd Bucyrus 95C
3 1/2 yd Bucyrus Monighan
4 1/2 yd Bucyrus Class 24
5 yd Marion 92
6-8 yd Bucyrus 225B
6-8 yd Bucyrus 230

SPECIAL

A 2 1/2 yd. Diesel Northwest Model 80D
A 1942 Diesel Northwest Model 78
A 2 1/2 yd. Diesel Lima Shovel and Dragline
A 1 3/4 yd. Osgood Diesel Shovel only
A 2 yd. Shovel and Dragline Northwest 70
A 1 3/4 yd. Bucyrus-Erie 43B Diesel Shovel Dragline
A 2 yd. Diesel Lorain 81 Shovel and Dragline
A 2 yd. Diesel Bucyrus-Erie 52 B Dragline

TELS. MURRAY HILL
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49 Vanderbilt Ave., N.Y.C.



16 YD. DRAGLINE:
1—16 Yd. Electric Caterpillar Modern Dragline with 160' Boom.

AIR COMPRESSORS:

(7) Steam 66 ft., 300 ft., 600, 1000 & 1940 ft.
(12") Belted 350, 675, 370, 1000, 1300 ft.
(12") Diesel 105, 315, 520, 675 & 1000 ft.
(6) Electric 1300, 1500, 2200, 5000 ft.
(14) Gasoline, 10, 160, 220, 210 & 370 ft.

RUBBER CONVEYOR BELTS:

1000' 60", 600' 30", 300' 20", 1000' 42", 900' 48", 1450' 36", 1200' 24", 900' 18", 600' 16", 350' 14"

TANKS:

12,000 and 15,000 gal. and 20,000 gal.

CONVEYOR PARTS:

Idlers, Heads & Tail Pulleys, Steel Frames, Tripper, etc., 14 in., 48 in. Large stock here.

STORAGE BATTERY LOCOMOTIVES:

2 1/2 ton Whitcomb 24 ga. New Batteries

2—5 ton Mancha 30 in. ga.

4—5 ton G.E. 36 in. ga.

3—7 ton Goodman 36 ga. Battery & Trolley

8—6 ton Baldwin Westph. 42 ga. & 36 ga.

DIESEL GENERATOR:

480 KW 3-60-2300 v. Cooper Bessemer

TROLLEY LOCOMOTIVES:

4—6 ton & 3—5 ton Goodman 36 ga.

3—6 ton Goodman 42 ga.

5—6 ton Westinghouse 42 ga.

10 ton Goodman 42 ga. & 13 ton Jeffrey

VIBRATING SCREENS:

9 Tyler Hummer 3x6, 4x5, 4x8, 4x10

2 Robbins Gyrex 4x8 1/2

4x12 Niagara, 3x8 L. B., 5x6 Simplex

CARS:

6—Western 16-20-30 yd. Slide Dump

30—50 ton Gondolas

12—50 ton Flat Cars

100—8000 & 10,000 gal. Tank Cars

SHOVELS, CRANES & DRAGLINES:

2 yd. Monaghan 60' Boom Walker

2 yd. P & H Model 730 75' Boom Diesel Dragline

2—2 1/4 yd. 45B Diesel Shovel—Draglines

2 yd. Page 70' Boom Diesel Dragline

1 1/4 yd. Marion 450 Elec. Shovel

2—120B—4 yd. Elec. Shovel—Dragline

25 ton Browning 50' Boom Loco. Crane

MINE LOADERS:

H23 Sullivan Tunnel Loader

3—5 BU & 7 BU & 12BU 36 or 42 ga. Joy

7 Conway 20A, 30A, 50A, 60 & 75 Muckers

5—Gardner Denver & Kimco Shovels

MISCELLANEOUS:

5"x60" Traylor Rotary Dryer

Clamshell Buckets 1/2, 1 1/4, & 2 yd. Cap.

30 ton & 12 ton Vulcan St. Ga. Gas. Loco.

67 ton Gas Elec. Locomotive

WANTED TO BUY:

Complete Mines—M.G. Sets, Locomotives, Com-

pressors, Conveyors, Cranes, Crushers, Mine

Loaders

R. C. STANHOPE, INC.

60 East 42nd St. New York, N. Y.

LATHES

36" x 24' American Grd. Hd. Two Carriages, Q.C.

27" x 16' Lodge & Shipley Grd. Hd. Taper—

RADIAL DRILLS

6' American Triple Purpose, M.D.

6' Cincinnati Bickford Radial M.D.

7' Cincinnati Bickford Radial M.D.

5' American Triple Purpose Plain.

CINCINNATI MACHINERY & SUPPLY COMPANY

218 E. Second St., Cincinnati, Ohio

IRON and STEEL PIPE

New and Used

Large stocks, all sizes attractive prices

L. B. FOSTER COMPANY

P. O. Box 1647 Pittsburgh 30, Pa.

REBUILT MINING EQUIPMENT

DOUBLE DRUM HOIST

1—50 HP Lidgerwood Double Drum Hoist, drums 24" x 24", good for 5000# RP and 4000 ft. of 1/2" rope, motor driven.

MOTORS - GENERATORS - TRANSFORMERS

JOHN D. CRAWBUCK CO PGH. (12) PA.

NEW AND GUARANTEED Used Steel Pipe and Boiler Tubes

Steel tanks—steel buildings all sizes and kinds Valves and fittings.

JOS. GREENSPON'S SON PIPE CORP.
Natl. Stock Yds., St. Clair Co., Ill.

FOR IMMEDIATE DELIVERY OF RUBBER PRODUCTS

Conveyor Belting...Transmission Belting...Elevator Belting...Fire, Water, Air, Steam, Suction or Welding Hose, etc.

CALL, WIRE or WRITE
CARLYLE
THE
RUBBER HEADQUARTERS

CARLYLE RUBBER PRODUCTS ARE NEW, GUARANTEED & LOW PRICED

CONVEYOR BELTING

ABRASIVE RESISTANT COVERS

Width	Ply	Top-Bottom	Covers	Width	Ply	Top-Bottom	Covers
48"	8	1/8"	1/16"	20"	5	1/8"	1/32"
42"	5	1/8"	1/16"	20"	4	1/8"	1/32"
36"	6	1/8"	1/16"	18"	4	1/8"	1/32"
30"	6	1/8"	1/16"	16"	4	1/8"	1/32"
30"	5	1/8"	1/16"	14"	4	1/16"	1/32"
24"	5	1/8"	1/32"	12"	4	1/16"	1/32"
24"	4	1/8"	1/32"				

Inquire For Prices - Mention Size and Lengths

TRANSMISSION BELTING

HEAVY-DUTY FRICTION SURFACE

Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

Inquire For Prices - Mention Size and Lengths

ENDLESS "V" BELTS

"A" WIDTH All Sizes "D" WIDTH All Sizes
"B" WIDTH All Sizes "E" WIDTH All Sizes
"C" WIDTH All Sizes Sold in Matched Sets
Inquire For Prices - Mention Size and Lengths

PROTECT THAT PLANT

FIRE HOSE

APPROVED SPECIFICATION HOSE EACH LENGTH WITH COUPLINGS ATTACHED

Size	Length	Per Length
2 1/2"	50 feet	\$28.00
	25 "	16.00
2"	50 "	23.00
	25 "	13.00
1 1/2"	50 "	20.00
	25 "	11.00

Specify Thread On Couplings

SPECIAL OFFER... HEAVY DUTY RUBBER HOSE

WATER HOSE
Each Length with Couplings Attached
I.D. Size Length per Length

I.D. Size	Length	per Length
3/4"	25 feet	\$4.25
1"	50 "	8.00
1 1/4"	25 "	6.25
	50 "	12.00
	35 "	7.50
	40 "	10.50
1 1/2"	50 "	12.00
	25 "	15.00
	35 "	10.00
	50 "	14.00
	50 "	20.00

I.D. Size	Length	per Length	Couplings
1/2"	25 feet	\$5.00	\$1.50 Pair
	50 "	10.00	1.50 "
3/4"	25 "	6.25	2.50 "
	50 "	12.50	2.50 "
1"	25 "	10.00	3.50 "
	50 "	20.00	3.50 "

LARGER SIZES ALSO AVAILABLE
All Prices—Net—F.O.B. New York

CARLYLE RUBBER CO., INC.

62-66 PARK PLACE

NEW YORK, N. Y.

PIPE-MACHINERY-GAS ENGINES AIR COMPRESSORS-DIESELS-PUMPS

Some Steam Engines and Boilers available only slightly above the metal price

BRADFORD SUPPLY COMPANY

WAYNE, WOOD COUNTY, OHIO

Near Toledo

PIPE

New & Reconditioned

ALL SIZES for ALL PURPOSES
Cut and Threaded to Your Specifications
VALVES AND FITTINGS

UNITED PIPE & SUPPLY CO.
Department 110
NORRISTOWN, PA.



REBUILT EQUIPMENT—READY TO SHIP

MOTOR GENERATOR SET

- 1—200 kw. West. 600 v. DC 900 rpm Gen. direct. driven through common shaft by 1—290 HP 440 v. 3 ph 60 cy. West. Sht. Motor.

ROTARY CONVERTERS

- 1—100 kw. 250/275 v. 1200 rpm. 6 pole type ICC. Has complete switchboard and transformers.
- 3—150 kw. West. 3 ph. 60 cy. 275 v. 1200 rpm. Rotary Converters comp. with transformers, switchboard.
- 3—300 kw. West. 3 ph. 60 cy. 600 v. 1200 rpm. Rotary Converters comp. with transformers, switchboard.

MINING MACHINES—250 v. DC

- 1—CE-7 Sullivan 36" ga.
- 1—Armature for CE-7 Sullivan 250 v. DC.

MINE LOCOMOTIVES

- 1—5 ton Ironton Storage Battery Locomotive.
- 3—5 ton Goodman 30 B 250 v. 36" ga.
- 1—10 ton Goodman Haulage or Gathering Locomotive, 250 v. 42" ga. Inside wheels.
- 1—13 ton Westinghouse 42" ga. 250 v. Locomotive, two motor type; single end control.

PUMPS

- 1—American Piston Pump, intake 5 1/2", discharge 4 1/2", size 8x12.
- 1—48 GPM 161" hd. Roper 3" suc. 3" dis. 7 1/2 HP 720 rpm. Motor.
- 1—90 GPM 225 ft. head, 600 rpm. 2x2" Blackmer Pump.
- 1—135 GPM 18" hd. Le Courtenay Cent. Pump. 3 HP 1150 rpm. Motor.
- 2—135 GPM 40" hd. Le Courtenay Cent. Pumps. 7 1/2 HP 1150 rpm. Motors.
- 1—200 GPM 30" hd. Le Courtenay Cent. Pump. 3 HP 1750 rpm. Motor.
- 2—200 GPM 80" hd. Le Courtenay Cent. Pumps. 7 1/2 HP 1750 rpm. Motors.
- 1—220 GPM 225 ft. head, 600 rpm. 3 1/2"x3" Blackmer Pump.
- 1—300 GPM 10" hd. Chicago 3" Vert. Sump Pump. 2 HP 1150 rpm. Motor.

SLIPRING MOTORS—3 ph. 60 cy.

HP	Make	Type	Volts	RPM
300	G.E.	I	440	900
260	Burke	EMV-65	440	600
260	Burke	EMV-65	2200	600
100	West.	HF	440	690
50	Chand.		220/440	1800
50 new	West.	CW	220/440	860
30	West.	CW	220	900
15	West.	CW	220	870

230 V. DC MOTORS

HP	Make	RPM	Type
1 1/4	Westg.	2200	SK
1 1/4	Westg.	900	CD
1 1/4	Robbins Myers	1750	
1 1/4	Master	3450	DM
2	Northern	1000	
2	Reliance	850	
3	West.	860	
3	G.E.	1250	CD
3	G.E.	1150	RC-26A
4	Cr. Wh.	1170	CM
4	Cr. Wh.	960	CM
5	Cr. Wh.	980	CM
5	Imperial	540	SK
5	Westg.	850	
10	Cr. Wh.	825	CM
10	Cr. Wh.	675	CCM
15	G.E.	1800	RC-9
20	Lincoln	720	
25	Lincoln	900	
30	Lincoln	1200	
35	West.	225	
75	West.	490	76A
80	West.	450	S
85	G.E.	900	DLC

TRANSFORMERS

No.	Kva.	Pri	Sec.	Make
1	2	1040/2080	52/104	G.E.
1	2	6600	110/220	G.E.
1	2 1/2	1040/2080	52/104	G.E.
2	3	2200/2100/2000	440/220/110	West.

1	3	2200	110/220	G.E.
1	5	2000/4000	80	West.
3	5	2200	220/440	G.E.
4	5	2200/1100	110/220	G.E.
1	5	2200	110/220	West.
1	5	2200	110/220	G.E.
1	7 1/2	2200	110/220	West.
69	7 1/2	1100/2200	110/220	G.E.
29	7 1/2	2200/1100	110/220	West.
8	7 1/2	2200/1100	440/220/110	West.
6	10	2200/1100	220/110	West.
10	10	2200/1100	220/110	G.E.
2	10	2300	220/110	G.E.
1	10	2200/1100	440/220/110	West.
21	15	2200/1100	440/220/110	West.
2	15	2300	230/460	American
3	15	2200	110/220	Packard
3	15	2200	110/220	Cr. Wh.
2	20	1150/2300	115/230	Maloney
2	20	2300	230/460	American
1	20	2300	110/230	West.
2	20	2200/1100	440/220/110	West.
2	25	2300	230/460	American
2	25	2300	110/220	West.
9	37 1/2	2400	240/480	G.E.
3	40	2200/1100	220/110	West.
1	40	1100/2200	110/220	Pittsburgh
1	40	2300/1150	115/230	Maloney
2	50	2200	110/220	Standard
1	50	6600	650/440	Cr. Wh.
1	50	2200/1100	220/110	West.
2	50	2200/1100	220/110	Maloney
3	75	2300	208-103 Rotary	G.E.
6	75	2400	240/480	G.E.
1	100	2300	230/115	Standard
3	125	2400	240/480	G.E.
3	125	2200	220/440	G.E.
2	150	2200/2300/2400	220/230/240	G.E.
3	250	6600/5940	2300	West.

AUTOMATIC RECLOSING CIRCUIT BREAKERS

- 1—300 Amp. 275 volts, type RBI, serial No. 6193.
- 1—400 Amp. 275 volt, type CRL, serial No. 6327.
- 1—400 Amp. 275 volt, type ARL, serial No. 7530.
- 1—600 Amp. Class I, type AHD, 275 v. Ser. No. 8051.

DIESEL ENGINE GENERATOR SET

- 1—40 kw. 250 v. DC Gen. belt driven by 65 HP Primm Diesel Hor. Engine.

DUQUESNE ELECTRIC & MFG. CO., PITTSBURGH (6), PA.

FOR SALE

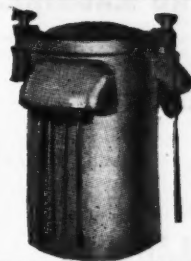
One Goodman Standard Shortwall CUTTING MACHINE

Completely overhauled with new feed drum and shaft, A.C. 220 V., 60 cycle, 3 phase for 36" gage track. Has about 200 ft. cable and 50 ft. hand cable with reel trucks. Machine guaranteed to be in A-1 condition. Stator coils, brand new, dipped and baked.

Wanted to Swap: Two Universal Goodman, tip-table cutting machine trucks (42" gage) in good condition, for two Universal Goodman low-volt, Stub axle (36" gage) trucks. The low-volt trucks must be in good condition, and we will trade even. Will buy out-right if no trade is wanted.

RICHARDSON COAL CO.
Linton, Ind.

—TRANSFORMERS—



BOUGHT and SOLD

We have several thousand transformers in stock for prompt shipment, and invite your inquiries.

PIONEER TRANSFORMER REBUILDERS

We rewind, repair and redesign all makes and sizes.

One Year Guarantee

THE ELECTRIC SERVICE CO., INC.

"AMERICA'S USED TRANSFORMER CLEARING HOUSE"

STATION M. Since 1912 CINCINNATI 27, OHIO

FOR SALE

HOISTS

- 1—Shepard Niles Electric Hoist to raise loading boom conveyors, capacity 2000#, 5 HP, 3 ph, 60 cy, 440 volts, with controls.
- 1—Ottumwa Electric hoist, single rigid-cylindrical drum, with automatic control. Weight of cage 7000#, weight of car 2500#, weight of coal 6000#, lift 310", diameter of rope 1 1/2". Diameter of drum 60"x84". Brake, 84" diameter, 8" face, post type, oil operated. Drum shaft bearings 10"x20". Hoist is equipped with single reduction gears 19 and 229 teeth, 2 1/2" D.P. 11" face. The drum has five grooves on the 60" diameter, 11 grooves up the cone, 4 grooves on the 84" diameter. The drum has a rope capacity of 326 feet plus three dead turns. The hoist is equipped with a 200 HP motor.
- 1—Ottumwa Electric hoist, single rigid conical drum type, with single reduction herringbone gear, the pinion running between two bearings and connected with motor by flexible coupling. Weight of cage 4000#, weight of car 1800#, weight of cage 4000#, total cage travel 210 ft., size of rope 1 1/2". End lift. The hoist is equipped with a 150 HP motor.

MINING MACHINES

- 2—Goodman Universal Shortwall mining machines, 112AA, 6' cutter bars, 50 HP motors, DC, 250 volts, 36" or 42" gauge.
- 1—Goodman Universal Shortwall mining machine, 112DB, DC, 250 volts, Cincinnati Duplex chain, 6' cutter bar. Has new extra armature. 36" or 42" gauge.
- 6—Goodman Standard Shortwall mining machines, 12AA, 250 volts, DC, 6' cutter bars. 36" or 42" gauge.
- 3—Goodman Longwall mining machines, DC, 36" or 42" gauge.
- 7—Jeffrey 35A Shortwall mining machines, 50 HP motors, 250 volts, DC, 6' cutter bars, 36" or 42" gauge.

- 3—Sullivan CE-7 Shearing machines, 250 volts, DC, 7 ft. cutter bars, 36" or 42" gauge.
- 1—Sullivan CE-7 Shearing machine, AC, 220 volts, 3 ph, 60 cy, 7 ft. cutter bars, 36" or 42" gauge.
- 1—Sullivan CE-7 Shortwall mining machine, AC, 220 volts, 3 ph, 60 cy, tip-turn truck, 7 ft. cutter bar, 36" or 42" gauge.
- 2—Sullivan Longwall mining machines, AC, #2991, #7061.

LOCOMOTIVES

- 3—Goodman 5 ton locomotives, type W1-2A5, 36" or 42" gauge. One is complete with electric reel.
- 2—Goodman 6 ton ball bearing locomotives, type 3314T, 36" or 42" gauge.
- 1—General Electric Co. 8 ton ball bearing locomotive, HM-839A motors, 36" or 42" gauge.
- 1—Westinghouse 8 ton locomotive, cast iron frame, 36" or 42" gauge.
- 1—Jeffrey 5 ton locomotive, cast iron frame, 36" or 42" gauge.

CRUSHERS

- 2—Jeffrey Crushers, single roll, size 30x30.
- 1—Jeffrey, Flextooth type crusher with rotary ring crushing elements, single roll, 24x36, complete with 50 HP Ball Bearing enclosed motor, 1200 RPM no load, 1155 RPM full load, V-belt driven. Crushes from 20" coal to 1/4" stoker coal.
- 1—American Pulverizer Company crusher, size 31"x36" Ball Bearing type S, Serial No. 1290, No. 24 driven by AC motor enclosed. Fan ventilated type direct connected to crusher by coupling motor, 30 HP, 600 RPM, 440 volts 3 phase, 60 cycle.

PIT CARS

- 42—Timken roller bearing cars, 8' overall length, bumper to bumper, 4'3" overall width, 2'3" overall height, 18 1/2" wheelbase, 14" wheels. End dump, one link and pin, 36" gauge.

BOX CAR LOADER

- 1—Ottumwa new type box car loader. Will load coal from tippie into box car.

CONVEYORS

- 6—Goodman shaker conveyors, type E, complete with pans, and accessories.

STEEL TIPPLES

- 1—Tippie and shaker constructed by Allen and Garcia Company. Capacity 3000 tons daily.
- 2—Tippies—smaller capacity than the one listed above. Have new and second hand rails and track accessories.

We are distributors for John A. Roebling Sons Company wire rope and fittings.

GAVENDA BROTHERS

CANTON, ILLINOIS



LOCOMOTIVES

Goodman: All 250 volts.

- 1—10 ton, 31 1-4-T.
- 1—6 ton, 30B, 43" 1—5 ton.
- 1—5 ton, W-1-2, 36".
- 2—5 ton, 2600 K.
- 1—6 ton, 33-1-4-T.
- 2—8 ton, 32-1-4-T.
- 2—15 ton 29A, 48" gauge

Westinghouse: All 250 volt.

- 1—4 ton, 902, 48"
- 1—904 c. 44" 500 volt. Also 906 motors.
- 1—10 ton, 915.

Bar steel frames 10 ton, 6 ton, and 4 ton

- G.E.: All 250 volt, 4 ton 1022, 44" as is
- 6 ton 803, 44" as is 5 ton 825, 44" & 36"
- 6 ton 823, 44" 8 ton 839 motors
- 6 ton 801
- 8 ton 839

Battery Locomotives G.E., Ironton and Atlas.

AERIAL TRAMWAYS • HOISTS • PUMPS • MOTORS • TRANSFORMERS • BOND WELDERS • RESISTANCE • COMPRESSORS • DUMPS • SPEED REDUCERS FIELD FRAMES • ARMATURES • GOODMAN HYDRAULIC SHOVELS • MOTOR STARTERS AND CONTROLLERS—AC & DC • DROP BAR SUPPORTS (Goose-neck), 29B and 29C • MINING MACHINE TRUCKS • SWITCHBOARDS • CIRCUIT BREAKERS—AC & DC • CONVEYOR HOISTS • COAL CRUSHERS (double roll) 12"x16", single roll 24"x36", 24"x24" • ROPE & BUTTON CONVEYOR 400' long • LATHES, SHAPERS • SWITCHES • AUTOMATIC CIRCUIT BREAKERS 250 volt 600 amps to 2000 amps • MANUAL CIRCUIT BREAKERS 600 amps to 3000 amps • HOISTS, overhead, AC 3-60-440, 1 ton and 2 ton • 1 clam shell bucket 1 1/2 cubic yard. 1—Figure 8 drum • MINE CARS • 2 SULLIVAN BIT SHARPENERS • R.R. SWITCHES 85# to 100# HOISTS 5 HP AC and DC GENERATORS DC 250-275 volt, 30 KW to 100 KW. Also 50 KW 125 vclt direct connected to steam engine.

GUYAN MACHINERY COMPANY, Logan, W. Va.

ROTARY CONVERTERS

500 KW AL-CH SYN 275 V. 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V. Transformers.

300 KW AL-CH SYN 275 V. 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V. Transformers.

300 KW G.E. SYN 575 V. HCC, 6 Ph., 60 Cy., 1200 RPM, form P, 2300/4000 V. Transformers.

150 KW WEST. SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, Bracket Type, 2300/4000 V. Transformers.

MOTOR GENERATORS

500 KW G.E. SYN. 600 V. 2200/4000 V., 3 Ph., 60 Cy., 720 RPM, Manual Switchgear.

300 KW WEST. SYN., 275 V. 2200/4000/6600 V., 3 Ph. 60 Cy., 900 RPM, Manual Switchgear.

200 KW G.E., Ind. 600 V. 2300/4000 V., 3 Ph., 60 Cy., 1200 RPM. Manual Switchgear.

LOCOMOTIVES

13-T WESTGHSE., 500 V., 908-C Mts., 36"-44" Ga.

10-T WESTGHSE., 500 V., 907-C Mts., 36"-44" Ga.

10-T WESTGHSE., 250 V., 907-C Mts., 36"-44" Ga.

8-T WESTGHSE., 500 V., 906-C Mts., 36"-48" Ga.

8-T GEN. ELEC., 250 V., 839 Mts., 36"-48" Ga.

Each unit listed above is owned by us and is available now for immediate purchase.

WALLACE E. KIRK COMPANY

Incorporated

501 Grant Building Pittsburgh, Pa.

Jeffrey: 6 ton, and 4 ton, all gauges, 250 volt.

MINING MACHINES

Jeffrey, 35B and 4—28A, 250 V. 4—29B, 29C, 29CE with shearing head. Revolving head for 29C.

Goodman, 12A, 12AB, 12AA, 12G3A, 24B.

1—12G3 250 volt and 2—112 DA, 500 volt.

2—Permissible Type 12CA. 6—112AA,

2—124 E.J.

Motors for 212AA, both 250 and 500 volts.

Sullivan, CE7, CE9, CE10. CR10 Low Vein.

CR5 for middle cutting.

SUBSTATIONS—275 volts, D. C.

2—200 KW G.E. Rotaries (600 volt).

2—150 KW West. Rotary.

1—206 KW 1—100 KW Ridgway M-G Sets.

2—100 KW G.E. Rotary.

1—200 KW Westinghouse M-G Set 900 RPM, 2300-275 volt.

ELECTRIC LOCOMOTIVES

1—13 ton GE with HM-829 motors.

1—10 ton GE steel frame, 250 V, HM-830A motors.

1—6 ton West. bar steel frame, with 904-C 250 V motors.

1—6 ton Jeffrey, MH-88 motors, any gauge.

2—6 ton GE with HM-823 motors.

1—5 ton GE ready to operate, 42" gauge.

2—5 ton Goodman 250 V, 36" gauge.

1—4 ton Jeffrey MH-96 motors.

COAL CUTTING MACHINES

1—124EJ Goodman, 50 HP, 250 V, permissible track mounted slabbing machine.

1—35B Jeffrey 250 V shortwall.

1—35BB Jeffrey AC shortwall.

1—35B Jeffrey 500 V shortwall.

1—12DA Goodman, 50 HP, 250 V, D.C.

1—12G3 Goodman, shortwall, 3/60/220 V, A.C.

1—12AB Goodman shortwall, 250 V, D.C.

1—36B Jeffrey, 250 V, 14" high.

MISCELLANEOUS

1—165 HP GE Syn. 2200 V, 900 RPM motor.

2—100 KW GE type TCC, Form P, Rotary Converters, 275 V D.C. with 2300-4000 volt transformers.

TIPPINS MACHINERY CO.

PITTSBURGH 13,

PENNSYLVANIA

FOR SALE

Two used 463 H.P. Class Q. No. 30. Special.

B&W STIRLING BOILERS

Working Pressure 150 pounds per square inch when new. Installed in 1914. Boilers complete with stacks, piping valves, blowers and accessories. If interested address your inquiry to

THE HUDSON COAL COMPANY

C. W. Carpenter, Purchasing Agent

424 Wyoming Ave. Scranton, Pa.

SPARE ARMATURES

Jeffrey MH 110, MH 78, MH 73, 29B, 35B and 28A. Goodman 34B, 30B, 30C, 12A, 12AB, 12AA, 33-1-4-T, 31-1-4-T. General Electric 801, 803, 819, 821, 825, 839. Westinghouse 904, 906, 102, 907, YR2, 115. Also 200 KW Westinghouse Rotary Converter Armature, 250 V Bracket Type, 150 KW G. E., HCC Bracket Type, and 150 KW G. E., TC Pedestal Type.

MINE HOISTS

1—Wellman, Keyed Drum, 60" Dia. will coil 4500 ft. 1" rope. 200 or 300 H.P. Motor with Magnetic Control.

1—Vulcan, Shaft Hoist, 72" Dia. Suitable 300 ft. Shaft. Motor with control to suit requirements.

1—Nordberg, Shaft Hoist, 72" Dia. Suitable 200 ft. Shaft. 150 H.P. Motor with Control.

1—Vulcan, Cyindro-Conical, Shaft Hoist. Drum 7'-9" Dia. Suitable 350 ft. Shaft. 400 H.P. Motor with Control.

Other Hoists available to suit all mining conditions.

JONES MINING EQUIPMENT CO.

Empire Building, Pittsburgh 22, Pa.

250 MINE CARS

Composite, electric welded, rotary dump type. Toncan steel, white oak bottom. Timken roller bearings, square alloy steel axles, 14" wheels, 4 wheel brakes, Gauge 44". Overall length 131", body 110", width 68", Wheelbase 36". Height above rail 42". Capacity 120 cu. ft. level. Swivel type hitchings.

These cars in service now, are offered subject to release August 1st, located within 20 miles Pittsburgh.

JONES MINING EQUIPMENT CO.

Empire Building, Pittsburgh 22, Pa.

USED WIRE ROPE DRAGLINES

- 1 1/4" STEEL CENTER
- 1 1/4" HEMP CENTER
- 1 1/2" HEMP CENTER
- 1 1/2" HEMP CENTER

CROWN CABLE CO.

54 E. 4 St. New York 3, N. Y.

NEW and REBUILT STORAGE BATTERY LOCOMOTIVES

1 1/2 to 10 Ton 13" to 56" Track Gauge

GREENSBURG MACHINE CO.
Greensburg, Penna.

- 1—Goodman 1 1/2-Ton Elec. Mine Locomotive, 24" gauge.
- 2—Goodman 5-Ton Elec. Mine Locomotives, 24"-30" gauge.
- 2—Goodman Elec. Mine Locomotives, 24"-30"-36" gauge.
- 1—Nordberg Butler Underground Loader, air powered.

EMPIRE EQUIPMENT CORP.

1783 E. 11th St. Cleveland 14, Ohio



SEARCHLIGHT SECTION



PROMPT SHIPMENT FROM OUR WAREHOUSE

MINING MACHINES

28 A Jeffrey 250 v. 6' cutter bar.
2-12 DA 50 HP 250 v. Goodman Shortwall.
12 G3 Goodman AC Shortwall, 220/3/60.
Jeffrey Permissible Top Cutter.

STORAGE BATTERY LOCOMOTIVES

2-6 Ton G.E. Permissible Locomotives 36/44" Ga.
O.S. armorplate frame. Inside steel tired wheels.
2-HM 825 Ball Bearing Motors, Type LSBE.
Class 2C6 Form C9. 13 1/4" long, 50" high, 69"
wide and 44" wheel base.
Each of the above units equipped with Edison
Battery 80 cell A-10—one new in 1940, the other
in 1939.
1-5 to 5 1/2 Ton Type D Iron-ton, 36" or 42" Ga.
1-5 Ton Atlas 40" or 44" Ga. with 2 Ball Bearing
Motors. Battery box on top of locomotive.
4 Ton 36" Ga. Atlas 2 BB Motors.
4 Ton 36" Ga. G.E. 2 BB Motors.

(Haulage)

13 Ton Westgh. 250 V. 36" or 40" Ga.
13 Ton Westgh. Bar Steel 500 v. 40/42".
10 Ton Jeffrey 500 V. 36/42" Ga.
6 Ton Jeffrey 250 v. 36/42" Ga. with motor driven
cable reel.
2-6 Ton G.E. 500 v. 42/44" Ga. gathering.
2-6 Ton G.E. 250 v. 42/44" Ga. gathering.

COAL LOADING MACHINES

4-G20 Goodman Permissible Drives
6-G15 Duck Bells
1-G20 Duck Bell with pans.
2-Brown Fayro LF 7 1/2 Pit car Loaders with per-
missible motors.
1-Le Grabon Rock Duster on truck 40/44" Ga.

SCREENS

2-4" x 5' single deck Tyler Hammer Screens. Type
37 equipped with V-16 Vibrators No. 2860 and
2867 designed for 110 v. AC 15 cy.

Rotary Con. & MG Sets (3 ph. 60 cy.)

2-300 KW G.E. HC 12 Rotary 275 v. 6 ph. with—
3-125 KVA G.E. 2300 v. 1 ph. 60 cy. Trans-
formers.
150 KW Ridgway 275 v. 900 RPM dir. con. 225 HP
Ridgway Syn. Motor 2300 v. complete
150 KW GE 275 V 900 RPM interpole dir. con. 225
HP GE syn motor 2300 V AC and DC panels.
Factory built units.
100 KW GE-BC 250 v. 1200 RPM dir. con. 150 HP
2200/440/220 Induction Motor complete
70 KW 250 v. S West—100 HP West. 220/440 v.
35 KW 125 v. S West—54 HP West. 220/440 v.
25 KW 250 v. S West—40 HP Al. Ch. 220/440 v.

ENGINE GENERATOR & TURBINE SETS

65 HP Primm Oil Engine belted to AC or DC Gen.
57.5 KVA Allis Chalmers Gen. 220/3/60—Kerr Tur.
50 KW West. 125 v. DC—Skinner Engine.
50 KW 125 v. DC West. Turbo. Gen.

TRANSFORMERS

Qu.	KVA	Pri. V.	Sec. V.
31	7 1/2	2200	220/440
28	10		
3	25	2200	2200
2	25	2200	110/220
1	37 1/2	2200	110/220
1	40	2200	110/220
1	50	2200 v.	440/220

HOISTS

75 HP Lidgerwood sgl. fr. drum 24" x 25"—4 1/4" flgs.
50 HP Thomas sgl. fr. drum 26" x 25"—4" flgs.
40 Lidgerwood sgl. fr. drum 40" x 30"—4" flgs.
30 HP Carlin double dr. fr. 13" x 18"—5 1/4" flgs.
The above Hoists can be equipped with AC or DC
Motors.

COAL CRUSHERS

18 x 18 sgl. roll Jeffrey.
18 x 24 and 18 x 30 New Scottsdale dbl. roll.

CONVEYORS & LOADING BOOMS

L. Boom & Picking Table 5' W 60' Long
Steel Apron conveyor 3' W 120' Long
Steel Apron conveyor 18' W 60' Long
3-7 1/2 HP DC—Joy Chain Conveyors with troughs

SLIP RING & SQ. CG. MOTORS

HP	Make	Speed	WDG.	Type
300	West.	1750	S.R.	CW
200	G.E.	250	S.R.	MT 412
150	G.E.	600	S.R.	I-M
150	G.E.	600	S.C.	I-L
150	West.	600	S.C.	CCL
150	West.	580	S.R.	CW
100	West.	1750	S.R.	CW
100	G.E.	500	S.R.	MI-25 cy.
40	Triumph	1800	S.C.	TR 11
25	West.	575	S.R.	CW

Other sizes down to 1 HP

DC Motors and Generators 230/250 V.

HP	Make	Speed	Wdg.	Type
175	G.E.	475	ser.	MD 109
150KW	Cr. Wh.	550	cp.	
130	G.E.	550	ser.	CO 1812
100	G.E.	480	ser.	MD 108
70KW	West.	720	cpd.	
60	West.	1750	cp. wd.	SK
60	G.E.	600	ser.	CO 2507
60	Cr. Wh.	800	cp.	
50KW	Cr. Wh.	1050	cp.	SK
40	West.	1750	cp. wd.	

PUMPS

4" Harris All bronze Cent. 500 GPM 190' Head with
AC or DC Motor.
4" Gould Bronze Fitted Cent. 500 GPM 160' Head
with AC or DC Motor.

AIR COMPRESSORS

12" x 10" Ing. Rd. ER 1 355 cu. ft. 100#.
9" x 8" Chg. Pneu. Type NSB 175 cu. ft. 100#.

MOORHEAD-REITMEYER CO., INC.

Pittsburgh 19, Pennsylvania

Serving the Coal Industry for more than a Quarter of Century

MINING MACHINES

AC & DC

REBUILT & GUARANTEED FOR IMMEDIATE SHIPMENT

2-yd. Industrial Brownhoist Link-
Type Coal Grab Bucket
Electric Coal Drills, Mine Fans,
Tippie Scales, etc.
2—Ironton 5-ton Storage Battery
Locomotives

1/2 yard GAS SHOVEL, rebuilt
PUMPS 4" and 6", centrifugal, gas driven.

Equipment of all kinds

Buy, Sell or Exchange

THE INDUSTRIAL EQUIPMENT CORP.

705 First National Bank Bldg.
Pittsburgh 22, Pa.

Warehouse: Carnegie, Pa.

★ MINING EQUIPMENT READY FOR DELIVERY ★

LOCOMOTIVES—ALL 250 VOLT

3-4-Ton Jeffrey, type MH-96, 36 to 44" gage
1-4-Ton Westinghouse, type 902, 42" gage
1-4-Ton Goodman, type 42-1-4-T, 42" gage
1-4-Ton G.E. type 825, low vein, 36" gage
1-5-Ton Goodman, type B-A, 48" gage
1-6-Ton Goodman, type 30-C, 42 or 44" gage
1-8-Ton Jeffrey, type MH-100, 42" gage
1-8-Ton Goodman, type 32-0-4-T, 42" gage
1-8-Ton Westinghouse, type 65, 44" gage
2-10-Ton Jeffrey, type MH-110, 42" gage

CUTTING MACHINES—ALL 250 VOLT

2-29-C Jeffrey Arcwalls, top or bottom cutters
2-35-L Jeffrey Shortwalls, 220-440 volt A.C.
2-12-AB Goodman Shortwalls, 35-HP.
1-12-AB Goodman Shortwall, 35-HP. Uni-
versal
1-12-AA Goodman Standard, 50-HP.
1-28-A Jeffrey, Shortwall

Armatures for Locomotives and cutting machines, Motors, Starters,
Transformers and many other items in stock.

ALL-STATE EQUIPMENT CO.

LOGAN, W. VA. Phone 884

SUBSTATIONS

1-50-KW. Westinghouse M-G set complete,
type SK 250 volt generator, type C 220 volt
Synchronous motor.
1-75-KW. G.E. M-G set complete, 275 volt
Generator, 2300/4000 volt induction motor.
2-150-KW. Ridgeway Motor-Generator set
complete, 275 volt generators, 2300 volt syn-
chronous motors. One manual switchboard,
one complete automatic switchboard.

MISCELLANEOUS

1-4-Ton Vulcan Gasoline Locomotive
1-60-HP. Fairbanks Morse Diesel Engine,
200 RPM.
1-Sullivan Bit Sharpening machine complete
with oil furnace
1-18x18" Jeffrey single roll coal crusher
1-5'x8' Fairmont Vibrating screen
1-No. 3 Cincinnati Milling machine complete
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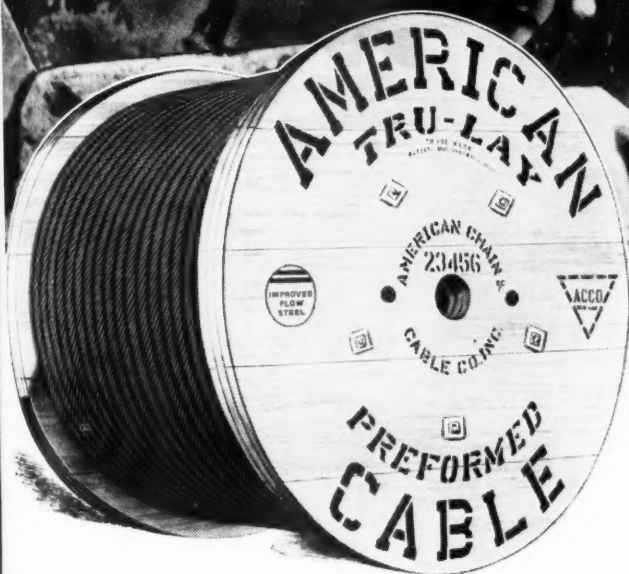
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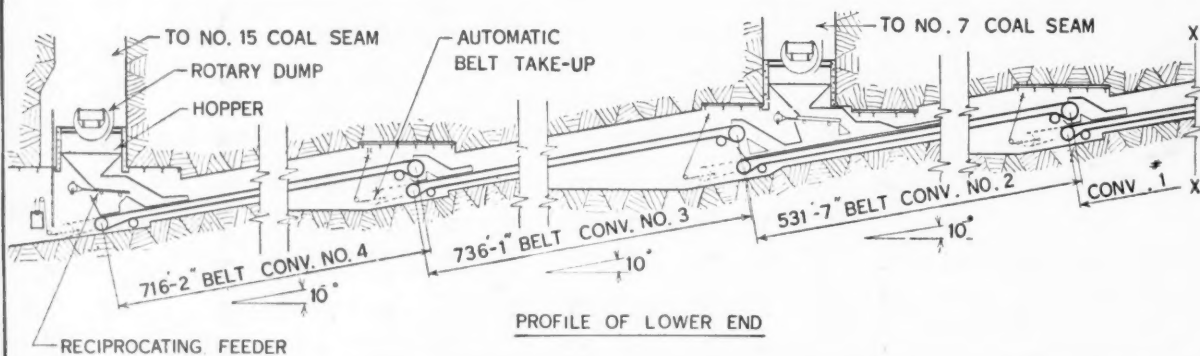
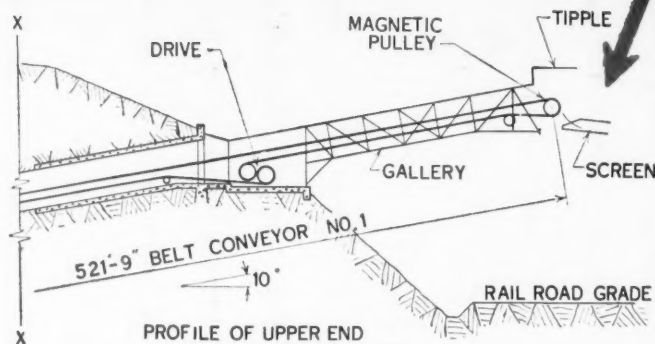
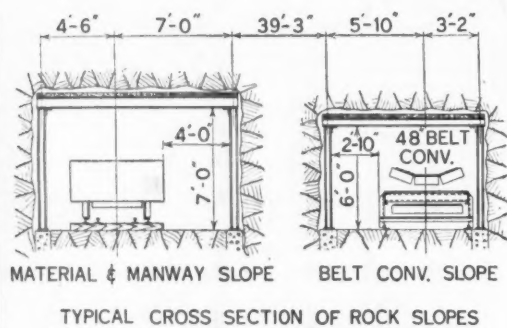
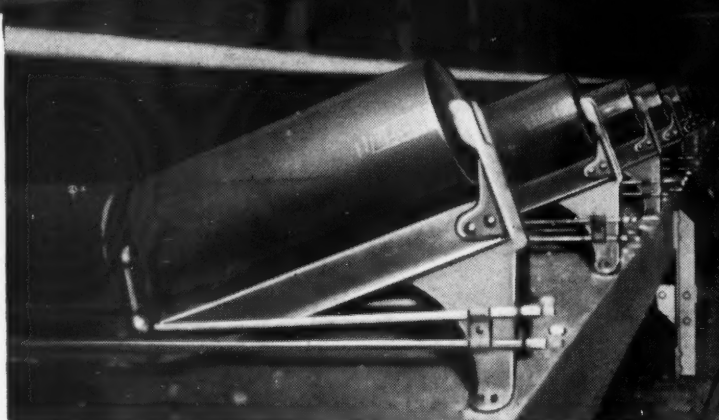
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